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N. N. Mace  
#2

OFFICIAL ORGAN OF THE NORTHWEST FRUIT GROWERS ASSOCIATION

VOLUME THREE

NUMBER SIX

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DOLLAR A YEAR

U. S. Department of Agriculture.

# BETTER FRUIT

*December 1908*

SPECIAL PLANTING, PRUNING AND GRAFTING EDITION



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*Luther Burbank*

PUBLISHED BY BETTER FRUIT PUBLISHING COMPANY, HOOD RIVER, OREGON

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Hood River, Oregon

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If you desire experienced and capable marketing agents to properly distribute and sell your fruit, either in Chicago or other markets, wherever best prices can be realized, write or wire us. Will always quote you conservatively.

N. G. Gibson, the head of this company, and W. C. Michael, our general Western representative, were two of the first fruit dealers to commence shipping and marketing Northwestern fruit in the Eastern markets. Our long experience and wide acquaintance with the buying trade all over the United States place us in an exceptionally strong position to secure you best results on what you have to market.

We make a specialty of selling f. o. b. entransit, or delivered, whichever way will bring highest net results to the shipper. We give all fruit that has to be sold at auction our personal attention. We also handle export shipments, our foreign representatives being the best and most reliable dealers in the principal foreign markets.

We refer you to The First National Bank, Chicago; Produce Reporter Company; their Weekly Credit Sheet of June 20th, 1908.

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*The largest and most extensive fruit concern in the world  
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## Exclusive Purveyors of High Class Fruits

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THE VERY FIRST CONCERN TO  
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**OREGON APPLES**  
TO THE CONSUMERS OF THE EAST

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*Greatest Apple Growing  
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and live comfortably all your life



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Portland, Oregon

Main Office  
Davidson Building  
Hood River, Oregon



# BETTER FRUIT

A MONTHLY ILLUSTRATED MAGAZINE PUBLISHED IN THE INTEREST  
OF UP-TO-DATE AND PROGRESSIVE FRUIT GROWING AND MARKETING

## PRACTICAL METHODS OF BUDDING AND GRAFTING

BY C. A. COLE, ASSISTANT HORTICULTURIST OREGON AGRICULTURAL COLLEGE, CORVALLIS, OREGON

IN this day of up-to-date orcharding the practice of graftage is indispensable to the fruit grower. Even the owners of small fruit gardens are becoming interested in this subject. This is not a rapid mode of reproduction, as the stock has to be grown, then grafted. However, as many of our most valuable trees and shrubs do not come true to variety from seed, or cannot be reproduced at all from seed, graftage has to be resorted to. Besides its uses in increasing the variety, it is often used to correct bad habits of trees, dwarfing, bridging over wounds and working over old and mixed orchards to two or three standard commercial varieties.

Graftage is subdivided into budding and grafting, depending on the part of the tree to be propagated that is used for a scion. One of the essential points on which the success of both budding and grafting depends, is to make sure that the cambium layers, or inner barks, of the scion and stock come in close contact. This layer is the only part of the tree, except the buds, where new cells are forming, and as the formation of new cells causes the union of the stock and scion, it is imperative that they come in contact. The wood of the stock and scion never unite. This can be readily demonstrated by taking an old graft and sawing through the union. A little wedge-shaped piece of wood will be found sticking in what was formerly the cleft of the stub. This little wedge

was the point of the scion. Beginning with what was the cambium layer, a solid woody ring will be found completely sealing up the cut surface of the stock.

### Budding

Of the two divisions of graftage, budding has become the most popular method of propagating fruit trees. Budding has been defined as applying a

packed in damp sawdust and stored in a cool place until ready for the nursery row. When set out they are given the same treatment as described for home-grown stock. After the stock makes a summer's growth the strongest are budded. It is not a good practice to bud weak stock; cut it back and bud the year following.

Perhaps one of the most important points to consider in either budding or grafting, is that of choosing scions. Fruit trees will respond to selection just as animals do; not to so marked a degree perhaps, but enough to fully warrant the extra trouble. The grower should select the trees from which the scion wood will be taken while they are in full bearing. There are always some trees which produce just a little better fruit and crop more regularly than their neighbors. These are the trees from which the scions should be cut. Scions, whether for budding or grafting, must be taken from the present year's growth. The best buds are located along the center of the twig. Never use the buds at either end of a twig, unless the scarcity of that particular variety warrants it, as the buds at the top are usually not fully mature, while those at the base are weak. Water sprouts should never be used, as they are of a soft spongy growth, but take the scion wood from the ends of the branches. In preparing a twig for fall budding, the leaves are cut off, leaving part of the leaf stock to serve as a handle for the bud. This twig is now known as a "bud stick."

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AT DIFFERENT ANGLES

single bud to the growing surface of a stock. The success of the operation lies in the "how" and "when" the bud is applied.

The time budding should be done is either in the fall or early summer. The latter is known as "June budding." In either period the bark should peel readily. The former is perhaps the most convenient and best time for budding. When working on seedlings you have stronger stock than if budded in June. For spring budding the scions must be cut in winter, before any sign of growth appears, and stored in a cool place until needed. For fall budding the scions are cut as needed. The style of budding that is almost entirely used in this country is "shield budding." It is practically the only kind used by nurserymen. This style of budding receives its name from the shape of the piece of bark and wood removed with the bud.

The stock for budding can be obtained from two sources. The grower can grow his stock from seed or buy it of nurserymen who make a practice of growing seedlings for market. When he grows his own stock the seeds are grown in a bed and the plants allowed to grow one summer; then they are set in a nursery row. The seedlings are headed back close to the ground and only one sprout allowed to grow. If the stock is bought from someone else, they come tied in bundles. These should be



FIGURE 1.—Common Method of Budding.



FIGURE 2.—Grafting chisel. This can be made out of an old file. The blade must not be driven into stock too far.



Protect these sticks from drying by wrapping in damp burlap or paper.

Cut the buds from the stick with a sharp knife. This is very important, as a sharp knife makes a clean, smooth cut, while a dull blade tears the cells and leaves a rough surface. The smoother the cut surface, the easier it will be for the cells to unite. There are many styles of budding knives on the market, each having some good points; however, any knife with a thin blade of good steel will do for a budding knife. Appliances for loosening the bark after the cuts are made are not essential, as one will not do a very great amount of budding after the bark begins to stick. In removing the bud from the stick, begin below the bud and cut upwards. This makes a perfectly smooth point for inserting in the matrix cut in the bark of the stock. A piece of wood is always removed with the bud. Some budders advise removing this wood, but as no bad effects are noticed by its presence, as time is lost in removing it, and also there is a risk of spoiling the bud, the advantages gained are not sufficient to justify the extra trouble. However, if the knife goes deep enough to remove some of the pith with the bud, then it is advisable to take out the wood.

The incision which is to receive the bud, is made by two cuts, one lengthwise of the stock and the other traverse. The former should be made first, by using the rounded point of the knife blade, making a cut of about one and one-half inches in length at the height above the ground desired for the bud. The traverse cut is made at the top of the vertical by one rocking motion of the knife, at the same time giving the blade a slight outward twist which opens the top of the vertical cut and allows the bud to be inserted. If the bark has begun to set, the matrix will have to be opened with the point of the knife. The bud is partly inserted with the fingers, or it may be partly inserted just as the operator holds it when cut from the

stick, then sent home by pressing down on the stub of the leaf stem. The bud should pass completely into the matrix.

The bud is now ready to be tied. The whole incision should be thoroughly closed, as is represented in Figure 1. This is accomplished by wrapping the string about twice above and three times below the bud and tying. The quickest and surest way to tie is to begin below the bud, wrap the string so that the second layer holds the loose end of the bandage; then proceed until the whole length of the cut is closed; secure the end by drawing it under the last layer and pulling tight. Care should be used in getting the bandage tight enough to hold the bud firmly against the growing surface. However, it should not be tight enough to bruise the bud. Also, never allow the bandage to cover up the bud. Almost any soft string can be used for bandage. No. 18 cotton string and raffia are mostly used. The latter is the bark obtained from a palm, and can be purchased of any seed house. This fiber does not work well unless moistened; however, if it becomes very wet it has a tendency to slack on drying, and allows the bud to be forced away from the growing surface of the stock. Some nurserymen prefer the string, as they say it does not loosen.

Under normal conditions the buds will have united with the stock in fifteen or twenty days. At the end of this period the grower should go over his nursery, examine the buds and cut the bandages on all of those that have stuck. This is done by simply drawing a sharp knife up the side of the stock opposite the bud, severing the bandage and allowing it to fall off at will. While doing this, if any of the buds have not stuck they can be reset, that is, provided the stock is still in condition. The bandage should not be left on any longer than is necessary, as at this time of the season the stems of the seedlings are expanding very rapidly, and the buds are liable to be injured by the bandage cutting into

them, or the pressure causing the bud to start into growth. The bud should remain perfectly dormant until spring. Growth at this time of year does not harden sufficiently to withstand winter.

In the spring following budding the nursery must be gone over and the seedlings headed back, so that the buds will be forced into growth. Some prefer to



FIGURE 4.—YOUNG TOP-WORKED TREE  
The scions have grown rapidly and a well-balanced tree is the result. This tree will need judicious pruning and care for several years. Photograph taken one and one-half years after grafting.

stub their seedlings, that is, cut them back to within six or eight inches of the bud; then when growth begins, cut back to the bud. Nurserymen say that apples and pears do just as well when cut back to the bud at the first cutting, while peaches do better stubbed. The stub answers the purpose of a stake for tying the shoot when there is danger of it being blown out by the wind. Under favorable conditions the bud will make a very strong growth the first year. Where budding is for the purpose of reheading trees, the sprouts should be pinched back to eight or ten inches at some time in July. Pinching out the top causes side branches to put out and a more stocky growth is obtained than when trained to a single stock.

#### Grafting

Grafting, as has been said, is closely allied with budding. Both are used to perpetuate desirable varieties of trees and shrubs. Instead of using a single bud in grafting, as is used in budding, a scion of about three buds is inserted in the stock.

There are many different methods of grafting, chief of which are the root graft and top graft. Each is so designated by the position the scion occupies on the stock. In root grafting, a root or piece of root is used as a stock. Top grafting is inserting the scion in the branches of the stock.

Root grafting is very extensively used in some nurseries as a cheap method of propagating trees. The style of root grafting mostly used, is known as whip or tongue grafting. It is employed on small stocks of three-quarter inch and less in diameter. Both the scion and



FIGURE 3.—A FAIR-SIZED TREE CUT BACK FOR TOP-WORKING  
Be sure to leave some of the top to carry off the surplus sap



stock are cut diagonally across, making a slope of about one and one-half inches in length, depending, of course, on the size of stock and scion. A tongue is cut on the slope of each. The cleft should begin at about two-thirds of the distance towards the point of both stock and scion. The tongue of the scion is pushed into the cleft of the stock and



FIGURE 5.—Result of two scions on same stock. This stock is decayed in center, practically lost. One scion would have saved this.

tied. Care should be used to match the cambium layers on one side. Whip grafting is usually done in February or March. The two or three-year-old seedlings bought from the nurseries are the best for stock, provided the roots are at least one-half inch in diameter. The grafts are tied in bundles and stored in damp sawdust until spring, then planted in the nursery row.

Top working is nearly always done by cleft grafting. However, some make a practice of scion budding, bark grafting, or budding the tops of old trees. In cleft grafting the limb is sawed off squarely, and split through the center with a grafting chisel. The cleft is then opened by driving in the wedge of the chisel, as in Figure 2. Two scions of about three buds are inserted, and the chisel knocked out by an upward blow on its back. In shaping the scion for the cleft, use a sharp knife and make the wedge with as few strokes as possible, as this gives a smooth, straight surface and insures close contact of a large surface of cambium layer. The wedge of the scion should be about one and a half inches in length, with the inner edge a little thinner than the outer. This allows the pressure to come directly on the cambium layers, thereby insuring its contact with that of the stock. In working large limbs there is always a tendency to set the scion too near the edge, which nearly always results in failure. This is caused by the thickness of the bark on the stub. The scion should be set in far enough to bring the cambium layers in contact. It is better to slant the scion

out just a little, as this insures a crossing of the cambium layers.

After the scions have been set the stub should be thoroughly waxed. Every particle of the cut surface must be covered, even the tips of the scions should have a coating of wax. There are many good waxes recommended. However, the grower will have to vary somewhat from the formula, in order to get a wax suited to his locality. For instance, at this station we use a wax made up of four parts resin, two parts beeswax and one part tallow; while at some of the stations, located in regions where the summers are hotter, as high as seven parts resin are used. The addition of a little powdered charcoal will prevent cracking. To prepare the wax, place the different ingredients in a vessel and heat until melted; then stir until thoroughly mixed. Pour the mass into a pail of water, and when cool enough, pull as you would taffy candy, until of a light straw color. This gives the wax toughness. In warm weather this wax can be used cold, but before handling coat the hands with tallow to prevent the wax adhering. When the wax is applied cold, flatten out a portion, place it over the bud at the top of the wedge, and stretch the mass out. Press the wax down against the stub with the thumb, completely sealing that side of the cleft. Treat the other side likewise, then flatten out a piece and place over the top of the stub. Wrap the wax that extends above the stub around the scions. This should completely seal up all cut surfaces. Some prefer to apply the wax warm or melted. In this case, the wax is melted and kept warm by means of hot water, hot bricks, or a small oil stove. Apply melted wax with a brush.

The best time for working old trees is in the spring, just before the buds begin to swell. In preparing a tree for top working, much depends on its age and former training. Old trees that have very large scaffolding limbs, should be cut back, as in Figure 3, and allowed to

produce new branches; then work the new wood. When the size of the limbs and the height and shape of the tree will permit, the top can be worked at once. There are some differences among authorities on grafting, as to whether or not some of the top should be left to protect the scion from overgrowth and to prevent excessive suckering. It is advisable to leave at least one small branch, although some of the professional grafters of the Willamette Valley say that they have good success when the entire top is grafted the first season. Mr. M. O. Lownsdale advocates cutting the tree off within a few inches of the roots, and then grafting three of the strongest suckers. This seems to be a very harsh process. However, it is about the only remedy for old, high-headed trees.

The pruning of the newly grafted head is very important, and under no circumstances should it be put off until one or two years after the grafting is done. The grafts, if conditions are favorable, make an enormous growth, producing a fair sized head in two years, as is seen in Figure 4. The grafts should not be allowed to grow a year without pruning. Begin pruning in July following the setting of the scion. All sprouts should be pinched back to eight or ten inches, as this causes a thickening up of the grafts, and also side branches to put out where they are desired. If this pruning is done properly a whole year's growth will be saved. If it is not done at the time stated, the growth should be cut back to eight or ten inches in March following. When left until March all the growth that would have been forced into side branches and to thickening up the graft, will be cut off. If both scions grow, one should be removed at the end of the second year. By allowing both to grow the stub is healed over much more quickly than if only one grew. However, if both are allowed to remain permanently, the result seen in Figure 5 will be sure to follow.



ORCHARD SCENE, WILLAMETTE VALLEY



# SCIENCE OF PRUNING AND SHAPING FRUIT TREES

BY PROFESSOR WENDELL PADDOCK, EXPERIMENT STATION OF COLORADO

It is not generally realized that when a tree is taken from the nursery row, a large portion of the root system is left in the ground. The balance between the roots and the top is thus destroyed, and obviously a part of the top should be removed. Practically all of the elements which nourish and build up a tree, save one, are taken from the soil by the roots in liquid form. This material is carried in the cell sap mostly through the outer sap wood, to the leaves. Here the crude food is changed by the influence of the sunlight and the green substance of the leaves to a form that can be readily assimilated by the plant. Much of this elaborated food may be stored in the cells, especially in the fall, to be drawn upon at any time that the roots fail to supply the requisite amount. In transplanting, the nursery tree is often deprived of one-half or more of its roots, and not only must it become established in the soil, but it must produce a large number of new roots before much new food can be supplied. In the meantime the leaves begin to push out and the reserve food and moisture may all be used before the root system is in a condition to supply more.

Is it any wonder, then, that the failure to cut back the tops of newly planted trees results in the death of many of them? This is especially true in Colorado, as the dry air and intense sunshine cause the young trees to dry out rapidly.

The trees should be heeled in deeply, at once, in damp soil, and when planting, the work should be so arranged that the roots shall be exposed to the air for the shortest possible time.

All bruised and torn roots should be carefully removed, leaving smoothly cut ends which will readily heal; if this is not done decay is apt to set in, which may seriously injure the tree. Long,

straggling roots may well be shortened, and if a tangled mass of fine roots are present they should be shortened and thinned. Some successful growers also insist that where large spreading roots occur a slanting cut should be made, so that the cut surface may rest flat upon the ground.

There are several insect pests and plant diseases which are very common on young trees. The woolly aphid is

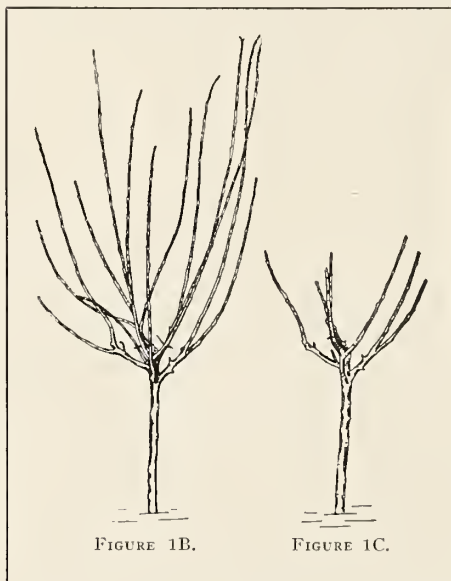


FIGURE 1B.

FIGURE 1C.

such an insect, and it is doing a great amount of damage in all sections of the state. This insect lives on the roots of trees, and is introduced to our orchards almost wholly by infected nursery stock. When once established it spreads rapidly and is almost impossible to eradicate. Crown gall is a common disease in many nurseries and it attacks all kinds of fruit trees. It is the worst kind of folly to plant a tree which has a trace of this disease, for not only is the tree pretty sure to die before it comes into full bearing, but the infection may be spread by the cultivator or in irrigation water to all parts of the orchard.

The proper formation of the top is by no means the least important reason for cutting back the branches of newly planted trees. In the first place, the importance of low-headed trees for this climate cannot be too strongly emphasized. In addition to forming low heads there can be no question but that it pays to still further protect the trunks of newly planted trees from injury by sun scald. Various devices are used, such as wrapping the trunks with burlap, paper, straw, wood veneer, or by shading the trunk on the southwest side with a thin piece of board set upright in the ground. Whitewashing the young trunks to serve the same purpose has come to be extensively used in portions of California.

The advantages of low-headed trees may be mentioned as follows: Greater ease in picking, thinning, pruning and spraying, and less damage to trees and fruit from winds. Some growers object to low-headed trees on account of the greater difficulty of cultivating around

them, but with proper pruning low-headed trees develop ascending branches as shown in Plate 1.

These trees (referring to illustration) can be worked around as easily as they could if they had only one trunk.

## Form of Tree

In pruning trees one of two ideals must be adopted, which are known as the pyramidal and vase forms. The former preserves the leader, which is made to form a central shaft to the tree. This style has the advantage of more bearing surface, as the leader grows and in time forms a "two-storied" tree. The leader is done away with in the vase form and a few limbs, usually not more than five, are selected to form the top. A more or less open centered tree is thus formed, but by skillful pruning this space is occupied by branches of bearing wood.

## Shaping the Newly Planted Tree

The term low-headed is a relative one, but a top may be considered low when the first branch is thirty inches from the surface of the ground. Our own preference is for a trunk about twenty inches in height. But whatever height is determined upon, the tree must be cut back, preferably just after it has been planted. Should the tree be supplied with suitable limbs at the point where the head is desired, three to five of them should be selected to form the framework of the tree. The rest are removed. The selected branches should then be shortened into a sound bud within a few inches of the main stem. But ordinarily the lower branches are pruned off in the nursery, so that we seldom get a tree from which suitable branches may be selected. In this case, the entire top should be removed without regard to branches, making the cut a foot to eighteen inches above the point where the lowest limb is wanted. In doing

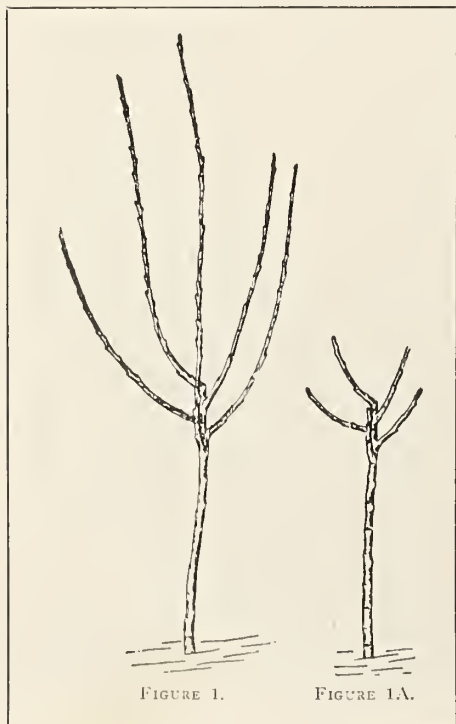


FIGURE 1.

FIGURE 1A.



FIGURE 2.

FIGURE 2A.



this it is expected that branches will push out below in sufficient numbers, so that suitable selections may be made. For this reason, strong yearling trees are always preferable to older ones, and in fact apple trees of this age are now commonly used in California. Should suitable branches fail to grow, one of the lower branches which nearly always form must be developed to form a new head.

The trees should be gone over several times during the first summer to remove surplus shoots and especially those which push out far below the point where the lowest branch is wanted. Occasionally some of the upper branches develop a vigorous growth at the expense of the others. These should be headed back so as to give all a chance to develop, otherwise some of the important scaffold limbs may be found to be very weak at the close of the season.

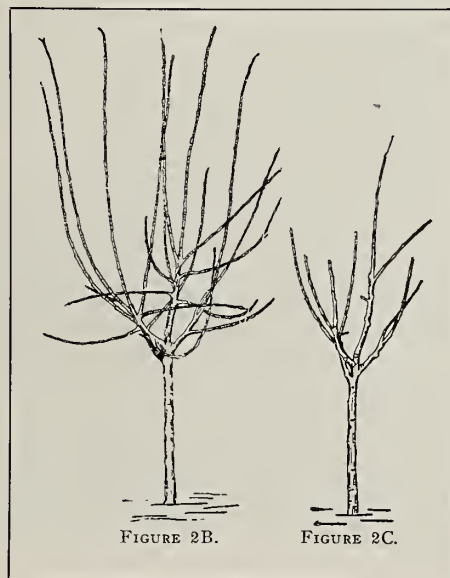
When a branch is headed back great pains should be taken to make a slanting cut just above a sound bud. If made too far above the stub will die back at least as far as the bud and often farther. If made too close, the bud may be so injured that a stub is formed which will die back at least to the next sound bud.

Ordinarily a profusion of branches will be pushed out, which may be allowed to grow as they will during the first season, or they may be cut back to one or two buds. By the time these branches begin to grow the roots are established in the soil and new ones formed, so that an adequate supply of plant food is provided.

The kind of top which the tree is to assume is developed with the first season's pruning, which should be begun in most sections not earlier than the first of March. It is commonly understood among orchard men that trees must not be pruned when the wood is frozen. In any case, the rule is a good one to follow.

From three to five limbs are now selected to form the framework of the tree, which should be cut back about twelve inches from the trunk. The rest

are removed. If the lowest branch has been taken out at twenty inches from the ground, the highest branch should be at least a foot above. A common mistake is to cut trees back too far, thus crowding the branches, as shown in Plate 1. Neither were these branches thinned out nor headed in during the first season, but were all allowed to develop into leaders. This latter mistake often results in long willowy branches, which droop with a load of fruit, and is the main reason for condemning low-headed trees. Many growers carry their pruning up to this point



successfully, but fail to head in the first season's growth and so miss one of the critical points in the proper formation of the top.

#### Second Year.

It may be regarded as a rule, that when a limb is cut back, unless the cut is made just above a strong lateral, two or more branches will develop near the cut end and some of the buds lower down will develop into shoots. The usual practice is to allow two of these to grow on each of the previous year's limbs to form an additional framework for the tree. The two selected should be some distance apart, one at the end and one farther back, and so placed that the development of crotches will be impossible. They are now cut back from a half to two-thirds of their growth and the laterals are shortened to one or two buds, so that they may later develop fruit spurs and also shade the branches with their cluster of leaves. If too many have formed, some of them should of course be removed.

#### Third Year

The framework of the tree should now be well formed, so that it will require less attention from this time on. Surplus branches and those that rub or are inclined to form crotches, should be removed. Very vigorous growths should also be headed in.

Thus far our discussion has been confined to the shaping of open or vase-formed trees. If a leader is desired, the treatment is practically the same, except that the upper shoot is allowed to grow with little heading in. Branches are allowed to develop on this leader at

proper intervals, using the same care as to location, pruning and development as in the former case.

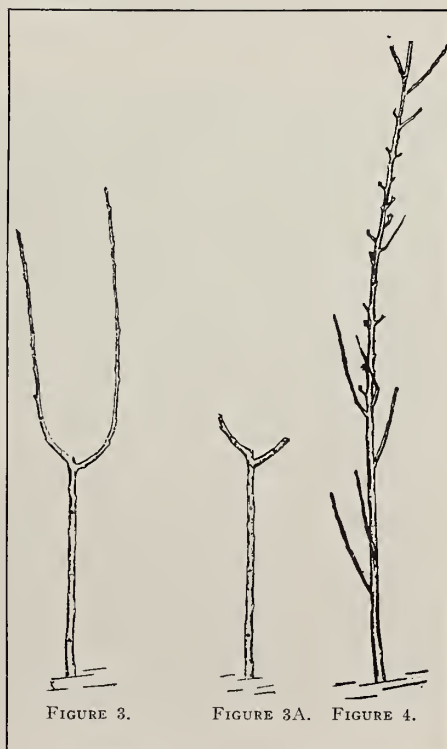
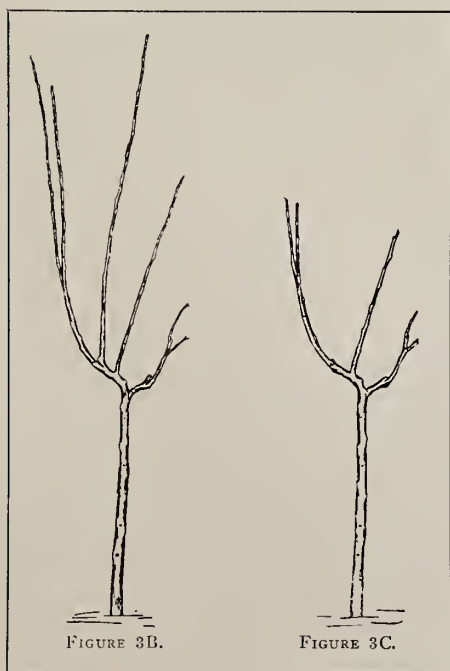
The trees in Figures 1 and 2 were all headed back about 24 inches in April, 1904. This left them mere stubs. Had there been any laterals below this point they would have been pruned back to single buds, so that clusters of leaves might have formed and thus provided some shade for the trunks. These pictures show how the trees looked in April, 1905, at the time of the first pruning. No. 1 had formed five vigorous branches and No. 2 produced four.

The five branches on No. 1 were saved to form a framework for the tree, and were cut back to about one foot in length. These are well distributed about the trunk, but have the fault that they are too close together. The lowest limb might well be double the distance from the top that it now is. No. 1a shows No. 1 after it was pruned, with the idea of making an open-centered tree.

No. 2 is also open to the objection that the limbs are too close. All of these were saved to form the framework of a tree with a leader, as is shown in No. 2a. The only difference between this and No. 1a being that the topmost branch was left longer than the others. The pruner of this tree is open to severe criticism, in that he has allowed three vigorous limbs to grow from near the surface of the ground. These limbs could serve no useful purpose and so only rob the other limbs of plant food. Such growths are best prevented by pinching off the buds early in the season.

No. 3 has failed to throw out enough branches to form a suitable top. The two which it produced are nearly opposite, so that a bad crotch would soon result. Both branches were cut back to the second bud, as shown in 3a, in the hope of inducing dormant buds to push out lower down.

No. 4 shows one of this lot of trees that was left unpruned. Notice the weak





spindling growth and short laterals, as compared with the others. There is small chance of making a decent tree out of such a specimen, even though it should live. Such illustrations as this should prove to anyone that all trees should be headed back when planted, if for no other purpose than to induce a vigorous growth.

At the close of the season of 1905 the pruned trees had made a growth respectively as shown in 1b, 2b and 3b.

Pruning should, of course, be done in late winter or early spring, but these trees were pruned for the purpose of illustration, and the results are shown in 1c, 2c and 3c. Tree No. 1 has now taken the form shown in 1c. One of the scaffold limbs seemed superfluous, so it was removed and the new growth, shown in Figure 1b, was cut back about one-half. The few side shoots were cut back to a single bud, with the idea of developing fruit spurs. During the season of 1906 numerous branches should develop on all of these scaffold limbs. As a rule, two of the best placed of these secondary limbs will be selected on each of the main scaffold limbs to form additional framework. The rest may be removed or cut back to develop fruit spurs as may be.

The form of the tree then should be developed at the beginning of the season of 1907, and subsequent pruning should be directed toward retaining this shape, cutting back excessive growths, and thinning and renewing the bearing wood.

The pruning of tree No. 2 is much the same, except that a leader is being developed. Figure 2c shows that although the top was cut back the same as tree No. 1, the topmost branch is developing into a vigorous central shaft. The first set of scaffold limbs have been formed and a second set is to be developed at a suitable distance above. The new growth is to be cut back the same as has been described.

The tree shown in the series 3-3c is, so far, pretty much of a failure. The severe heading given it in the spring of 1905 failed to make branches develop lower down. It would have been a bet-

ter plan to have inserted two or three buds at suitable points around the main stem in June, 1905. This can probably be done next June, but the chance for success is not so great. Limbs can be developed by this means just where they are wanted, but the average person will succeed better with trees which do not require such manipulation.

#### Pruning Bearing Trees

The form of the young tree should be well established after the third season.

that summer pruning checks the growth of the tree by removing a portion of the leaf surface. An injury of any kind will have the same effect, likewise a weak-growing or sickly tree should be severely headed in while still dormant in order to induce a vigorous top growth.

Thin out the top then every year. No general rule can be given, as each tree presents a different problem. A thick growth of branches results in weak bearing shoots and spurs. And finally, when cutting back limbs on bearing trees, the



PLATE 2.—SHOWING YOUNG APPLE TREES WELL HEADED IN

From this time on, the question of pruning is simply to retain, so far as possible, the form we have started, to prevent the formation of crotches and cross branches, to thin out an excess of branches, so that sunlight may be admitted and the amount of bearing wood reduced and renewed.

Prune in summer to induce fruitfulness, and in winter to promote wood growth. This is true for the reason

cut should be made just above a strong lateral wherever possible. The tendency of the sap will be to flow into the lateral and thus prevent the formation of numerous branches which nearly always results when a stub cut is made.

One should become well acquainted with the habit of growth of different varieties, as a few kinds grow slowly and will not bear heavy pruning. Others are erect growers and some are spreading. The upright varieties may be spread somewhat by pruning to the outside laterals, and the spreading kinds may be contracted by cutting to those which have an inward direction. And by cutting back the vigorous growths each season, those two feet and over in length, the limbs are made stocky, thus in a great measure doing away with drooping branches. This can only be done by intelligent annual pruning. In Plate 2 is shown a photograph of a successful young orchard that has been severely headed in.

• • •



PLATE 1.—SHOWING LOW-HEADED TREES WITH ASCENDING BRANCHES

THE cherry needs but little pruning, and is, in fact, easily injured by cutting the main limbs. Such work as is generally needed should be confined to thinning the fruit spurs in the top of the trees and the keeping of the center open. The outside limbs will droop more or less and this shows that the trunk needs shade. The finest cherries are usually grown on these under limbs in the deepest shade and proves that while the cherry delights in a warm soil and sunny slope, it has a way of its own of protecting the fruit.



# FUNDAMENTAL PRINCIPLES OF PLANT BREEDING

BY LUTHER BURBANK, SANTA ROSA, CALIFORNIA

ONLY the most limited view of plant-breeding can be given in an ordinary thesis. It would be necessary to extend the subject through many volumes to give even a general view of what has already been demonstrated, and that which the clear light of science has yet to bring forth from the depths is too extensive even for the

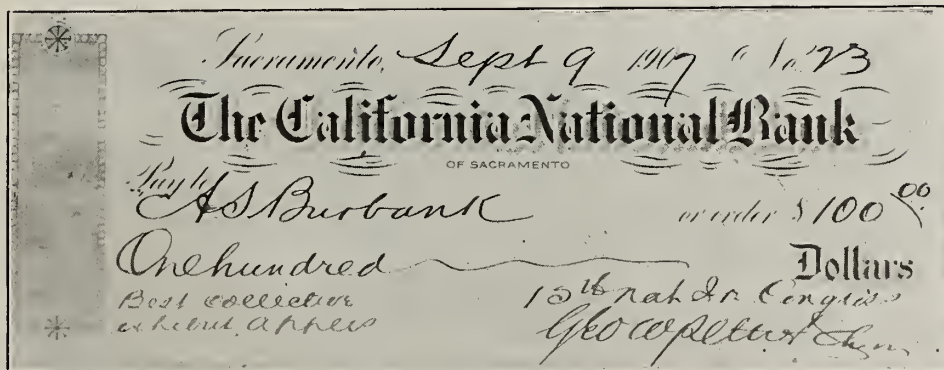
produced by the combination of numerous tendencies, individuals are produced which are better endowed to meet the prevailing conditions of life. Thus to Nature's persistence in crossing do we owe all that earth now produces in man, animals or plants; and this magnificently stupendous fact may also be safely carried into the domain of chemistry as

we fully grasp these facts there is nothing mysterious in the sudden appearance of sports; but still further intelligent crossings produce more immediate results and of great value, not to the plant in its struggle with natural forces, but to man, by conserving and guiding its life-forces to supply him with food, clothing and innumerable other luxuries and necessities. Plant-life is so common that one rarely stops to think how utterly dependent we are upon the quiet but magnificently powerful work which they are constantly performing for us.

It was once thought that plants varied within the so-called species but very little, and that true species never varied. We have more lately discovered that no two plants are ever exactly alike, each one having its own individuality, and that new varieties having endowments of priceless value, and even distinct new species, can be produced by the plant-breeder with the same precision that machinery for locomotion and other useful purposes are produced by the mechanic.

The evolution and all the variations of plants are simply the means which they employ in adjusting themselves to external conditions. Each plant strives to adapt itself to environment with as little demand upon its forces as possible and still keep up in the race. The best-endowed species and individuals win the prize, and by variation as well as persistence. The constantly varying external forces to which all life is everywhere subjected, demand that the inherent internal force shall always be ready to adapt itself or perish.

The combination and interaction of these innumerable forces embraced in heredity and environment, have given us all our bewildering species and varieties, none of which ever did or ever will



FIRST PREMIUM WON AT THE NATIONAL IRRIGATION CONGRESS, SACRAMENTO, CALIFORNIA, 1907

Photograph of check paid to Captain A. S. Burbank, Cashmere, Washington, in the Wenatchee Valley

imagination to grasp, except through a full knowledge of what practical field-work has already accomplished.

The fundamental principles of plant-breeding are simple, and may be stated in few words; the practical application of these principles demands the highest and most refined efforts of which the mind of man is capable, and no line of mental effort promises more for the elevation, advancement, prosperity and happiness of the whole human race.

Every plant, animal and planet occupies its place in the order of Nature by the action of two forces—the inherent constitutional life-force with all its acquired habits, the sum of which is heredity; and the numerous complicated external forces or environment. To guide the interaction of these two forces, both of which are only different expressions of the one eternal force, is, and must be, the sole object of the breeder, whether of plants or animals.

When we look about us on the plants inhabiting the earth with ourselves, and watch any species day by day, we are unable to see any change in some of them. During a lifetime, and in some cases perhaps including the full breadth of human history, no remarkable changes seem to have occurred. And yet there is not today one plant species which has not undergone great, and to a certain extent, constant change.

The life-forces of the plant in endeavoring to harmonize and adapt the action of its acquired tendencies to its surroundings may, through many generations, slowly adapt itself to the necessities of existence, yet these same accrued forces may also produce sudden, and to one not acquainted with its past history, most surprising and unaccountable changes of character. The very existence of the higher orders of plants which now inhabit the earth, has been secured to them only by their power of adaptation to crossings, for through the variations

well, for what is common air and water but Nature's earlier efforts in that line, and our nourishing foods but the result of myriad complex chemical affinities of later date?

Natural and artificial crossing and hybridization are among the principal remote causes of nearly all otherwise perplexing or unaccountable sports and strange modifications, and also of many of the now well-established species. Variations, without immediate antecedent crossing occur always and everywhere from a combination of past crossings and environments, for potential adaptations often exist through generations without becoming actual, and when



CHERRY ORCHARD, THE DALLES, OREGON



remain constant, for the inherent life-force must be pliable or outside forces will sooner or later extinguish it. Thus adaptability, as well as perseverance, is one of the prime virtues in plant as in human life.

Plant-breeding is the intelligent application of the forces of the human mind in guiding the inherent life-forces into useful directions by crossing to make perturbations or variations and new combinations of these forces, and by radically changing environments, both

ing the occasional sneers of the ignorant, these silent forces embodied in plant-life have yet a part to play in the regeneration of the race which by comparison will dwarf into insignificance the services which steam and electricity have so far given. Even unconscious or half-conscious plant-breeding has been one of the greatest forces in the elevation of the race. The chemist and the mechanic have, so to speak, domesticated some of the forces of Nature, but the plant-breeder is now learning to guide even

The main object of crossing genera, species or varieties is to combine various individual tendencies, thus producing a state of perturbation or partial antagonism by which these tendencies are, in later generations, dissociated and recombined in new proportions, which gives the breeder a wider field for selection; but this opens a much more difficult one—the selection and fixing of the desired new types from the mass of heterogeneous tendencies produced, for by crossing bad traits as well as good are



MOSIER VALLEY EXHIBIT AT HOOD RIVER BIENNIAL FAIR

of which produce somewhat similar results, thus giving a broader field for selection, which again is simply the persistent application of mental force to guide and fix the perturbed life-forces in the desired channels.

Plant-breeding is in its earliest infancy. Its possibilities, and even its fundamental principles, are understood but by few; in the past it has been mostly dabbled with tremendous forces, which have been only partially appreciated, and it has yet to approach the precision which we expect in the handling of steam or electricity, and, notwithstand-

the creative forces into new and useful channels. This knowledge is a most priceless legacy, making clear the way for some of the greatest benefits which man has ever received from any source by the study of Nature.

A general knowledge of the relations and affinities of plants will not be a sufficient equipment for the successful plant-breeder. He must be a skillful botanist and biologist, and having a definite plan, must be able to correctly estimate the action of the two fundamental forces, inherent and external, which he would guide.

always brought forth. The results now secured by the breeder will be in proportion to the accuracy and intensity of selection, and the length of time they are applied. By these means the best of fruits, grains, nuts and flowers are capable of still further improvements in ways which to the thoughtless often seem unnecessary, irrelevant or impossible.

When we capture and domesticate the various plants, the life-forces are relieved from many of the hardships of an unprotected wild condition, and have more leisure, so to speak, or, in other

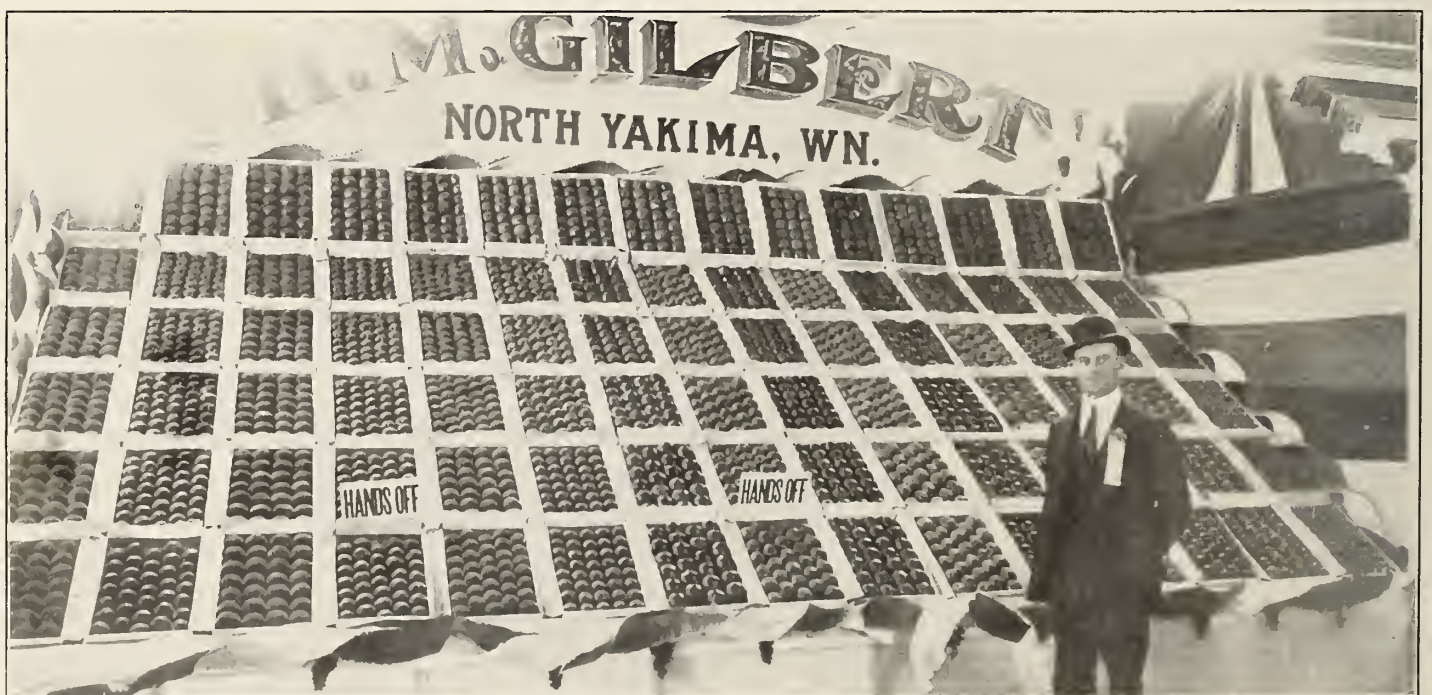


EXHIBIT OF H. M. GILBERT, PRESIDENT OF THE WASHINGTON STATE HORTICULTURAL SOCIETY, FRUIT GROWER AND BUYER AT NORTH YAKIMA AND TOPPENISH. NOT ENTERED FOR COMPETITION



words, more surplus force, to be guided by the hand of man under the new environments into all the useful and beautiful new forms which are constantly appearing under cultivation, crossing and selection. Some plants are very much more pliable than others, as the breeder soon learns. Plants having numerous representatives in various parts of the earth generally possess this adaptability in a much higher degree than the monotypic species, for having been subjected to great variations of soil, climate and

upon by combination for still further variations.

The plant-breeder before making combinations should with great care select the individual plants which seem best adapted to his purpose, as by this course many years of experiment and much needless expense will be avoided. The differences in the individuals which the plant-breeder has to work upon are sometimes extremely slight. The ordinary unpracticed person cannot by any possibility discover the exceedingly mi-

through many generations is imperative, after which several generations are often, but not always, necessary to thoroughly "fix" the desired type for all practical purposes.

The above applies to annuals, or those plants generally reproduced by seed. The breeder of plants which can be reproduced by division has great advantage, for any valuable individual variation can be multiplied to any extent desired without the extreme care necessary in fixing by linear breeding the one



EXHIBIT OF FRUIT OF THE LEWISTON, IDAHO, AND CLARKSTON, WASHINGTON, DISTRICT, AT THE LEWISTON-CLARKSTON INTERSTATE FAIR

other influences, their continued existence has been secured only by the inherent habits which adaptation demanded, while the monotypic species, not being able to fit themselves for their surroundings without a too radically expensive change, have continued to exist only under certain special conditions. Thus two important advantages are secured to the breeder who selects from the genera having numerous species—the advantage of natural pliability, and in the numerous species to work

nute variations in form, size, color, fragrance, precocity and a thousand other characters which the practiced breeder perceives by a lightning-like glance. The work is not easy, requiring an exceedingly keen perception of minute differences, great practice and extreme care in treating the organisms operated upon, and even with all the naturally acquired variations added to those secured by scientific crossing and numerous other means, the careful accumulation of slight individual differences

which must be reproduced by seed. But even in breeding perennials the first deviations from the original form are often almost unappreciable to the perception, but by accumulating the most minute differences through many generations the deviation from the original form is often astounding. Thus, by careful and intelligent breeding any peculiarity may be made permanent, and valid new species are at times produced by the art of the breeder, and there is no known limit to the improvement of



SPOKANE HORTICULTURAL SOCIETY EXHIBIT AT WASHINGTON STATE FAIR, NORTH YAKIMA. ONE OF THE PRIZE WINNERS



plants by education, breeding and selections. The plant-breeder is an explorer into the infinite. He will have "no time to make money;" his castle, the brain, must be clear and alert in throwing aside fossil ideas and rapidly replacing them with living, throbbing thought followed by action. Then, and not till then, shall he create marvels of beauty and value in new expressions of materialized force, for everything of value must be produced by the intelligent application of the forces of Nature which are always awaiting our commands.

The vast possibilities of plant-breeding can hardly be estimated. It would not

estimate the elevating and refining influences and moral value of flowers, with all their graceful forms and bewitching shades and combinations of colors and exquisitely varied perfumes? These silent influences are unconsciously felt even by those who do not appreciate them consciously, and thus with better and still better fruits, nuts, grains and flowers will the earth be transformed, man's thoughts turned from the base, destructive forces into the nobler productive ones which will lift him to higher planes of action toward that happy day when man shall offer his brother man, not bullets and bayonets,

Every one of these, and ten thousand more, are within the reach of the most ordinary skill in plant-breeding.

Fellow plant-breeders, this is our work. On us now rests one of the next great world movements, the guidance of the creative forces are in our hands.

Man is slowly learning that he too may guide the same forces which have been through all the ages performing this beneficent work which he sees everywhere above, beneath and around him in the vast teeming animal and plant life of the world.

These lines were penned among the heights of the Sierras, while resting on



YAKIMA COUNTY EXHIBIT TAKING BLUE RIBBON AT WASHINGTON STATE FAIR, NORTH YAKIMA  
By courtesy Tennant & Miles

be difficult for one man to breed a new rye, wheat, barley, oats or rice which would produce one grain more to each head, or a corn which would produce an extra kernel to each ear, another potato to each plant, or an apple, plum, orange or nut to each tree.

What would be the result? In five staples only in the United States alone the inexhaustible forces of Nature would produce annually, without effort and without cost, 5,200,000 extra bushels of corn, 15,000,000 extra bushels of wheat, 20,000,000 extra bushels of oats, 1,500,000 extra bushels of barley, 21,000,000 extra bushels of potatoes.

But these vast possibilities are not alone for one year, or for our own time or race, but are beneficent legacies for every man, woman and child who shall ever inhabit the earth. And who can

but richer grains, better fruits and fairer flowers.

Cultivation and care may help plants to do better work temporarily, but by breeding, plants may be brought into existence which will do better work always, in all places and for all time. Plants are to be produced which will perform their appointed work better, quicker and with the utmost precision.

Science sees better grains, nuts, fruits and vegetables, all in new forms, sizes, colors and flavors, with more nutrients and less waste, and with every injurious and poisonous quality eliminated, and with power to resist sun, wind, rain, frost and destructive fungus and insect pests; fruits without stones, seeds or spines; better fiber, coffee, tea, spice, rubber, oil, paper and timber trees, and sugar, starch, color and perfume plants.

the original material from which this planet was made. Thousands of ages have passed and it still remains unchanged. In it no fossils or any trace of past organic life are ever found, nor could any exist, for the world-creative heat was too intense. Among these dizzy heights of rock, ice-cleft, glacier-plowed and water-worn, we stand face to face with the first and latest pages of world creation, for now we see also tender and beautiful flowers adding grace of form and color to the grisly walls, and far away down the slopes stand the giant trees, oldest of all living things, embracing all of human history; but even their lives are but as a watch-tick since the stars first shone on these barren rocks, before the evolutive forces had so gloriously transfigured the face of our planet home.



# PRINCIPAL DETAILS IN ESTABLISHING AN ORCHARD

BY CLAUDE I. LEWIS, PROFESSOR OF HORTICULTURE, OREGON AGRICULTURAL COLLEGE

**T**HE large profits realized from our orchards the past few years have given a great impetus to fruit growing, and as a result, many people are setting out orchards. To a large number of these persons fruit growing is a new occupation and they are seeking information to aid them in establishing their orchards.

As regards the time to set the trees, from October to February or March is generally preferable where climatic conditions are such as to allow one to carry

loose gravel that does not reach a water supply are to be avoided. In many parts of Western Oregon the alluvial soils that have been washed in by the rivers, they often appearing light in character, are among our best fruit soils, being rich and deep and generally furnished with plenty of moisture. East of the mountains the rich volcanic soils, when furnished with humus and given plenty of water, will grow most any of our fruits.

Other things being equal, the higher elevations and slopes are to be preferred.

are better than the very small or the very large. We are fortunate in Oregon in having nurseries that can furnish the finest of trees.

When the trees come from the nursery they should be immediately unpacked, and, if in good condition, a trench should be immediately dug deep enough to cover the roots, and the trees are generally dropped in at an angle of about forty-five degrees. This will keep the trees in good condition until planted. Never bury them in bundles



WENATCHEE VALLEY EXHIBIT AT STATE FAIR, NORTH YAKIMA, 1908, WINNING MERCHANTS' SPECIAL FIRST PRIZE

on the work. Trees set at this time become well established in early spring and are ready to begin growth in April. In irrigated sections, or at the high elevations, where there is danger of fall freezing, planting can be delayed until spring.

The kind of soil is a question of importance, and in speaking of soils we consider both the physical and the chemical. The physical is, perhaps, the more important in that its conditions are hard to change, while often in the chemical we can supply lacking plant foods. Often the grower expects the chemist to analyze a small sample of his soil and tell him what it needs. The chemist can tell if certain elements are deficient, but he cannot tell whether those present are in an available form, and the grower is therefore forced to try experiments. As far as the physical characters of soil are concerned, apples in our climate prefer a clay loam, not necessarily a heavy clay, but a clay loam which is apt to retain moisture and food such as apples need. Pears will grow on similar soil to apples or even heavier soil. Cherries and prunes prefer the lighter loam, such as many of the red hill lands, especially where the soil is deep. Peaches do well on the granitic, sandy soils; while grapes prefer the sunny southeast slopes, especially those which are deep and contain more or less stony subsoil. The main requirement with the walnut seems to be a deep soil. Attention should be paid to the subsoil. Those soils having a hardpan near the surface, a cement gravel, or a

They are apt to be better drained, more free from frosts, and often seem to produce fruit of better color.

Having chosen your land, the next step is to prepare it. If this is old wheat land it should be thoroughly plowed and harrowed, and where possible stable compost should be added. On many of the newly irrigated lands it is often better to irrigate a season or two, growing some crop to supply humus, before planting the orchard. On many of the stump lands, holes can be dug for the trees and the land prepared as rapidly as possible. By the time the trees need the intense cultivation over a large surface the stumps will have been removed.

The question of varieties is a difficult one to settle. Certain localities of our state have already determined this, but to those localities where commercial orchards have not as yet been developed, the rule would be to grow those commercial varieties which show the most promise in your immediate locality. Lacking this information, try a few of the leading commercial varieties. Three to five varieties will be enough for a commercial orchard, and it is much better to plant at least three to insure thorough pollination, as some of our leading varieties seem to be sterile.

Often we are asked what age and size of trees is best. The one-year-old tree is to be preferred. It will establish itself more easily and can be headed low, thus saving much money in future years in spraying, thinning, pruning and harvesting the crop. The medium sized trees

for a long period, as they will often heat and decay. If they arrive somewhat dried and shriveled, bury them in moist earth or submerge them in water. The bark will often puff out and nearly all the trees will live. The distances to plant trees apart is a matter of interest all over the state, as there is a tendency to plant them too close. On our rich virgin soils, with plenty of moisture, our orchards can be planted closely and probably make the best use of the land for the first ten or twelve years, when they begin to crowd.

It takes a good deal of nerve to cut out half an orchard that has been yielding a large profit, but if that is not done the whole orchard will be ruined; so, for a great many people, it would be better to plant the trees their permanent distance and grow some garden crop in between if necessary for the first few years. There is, however, one system that will allow you to cut out some trees. Apples should be planted from thirty to forty feet apart; the smaller varieties of pears in the neighborhood of twenty, while some of the larger varieties of pears will stand thirty. Where the cherry attains a good size it will need from thirty to thirty-five feet. Small varieties of peaches, twelve to fifteen, and the larger, fifteen to twenty, and probably some varieties will do better with even twenty-five. Our older prune orchards are showing that thirty feet is none too far, while grapes are often

Continued on page 31



# DIRECTIONS FOR THE PLANTING OF AN ORCHARD

BY R. H. WEBER, THE DALLES, OREGON

**I**N presenting these instructions we would earnestly request that they be given the most careful attention as to details. They have been compiled with a view to make them as simple as possible.

## Preparation of the Soil

The preparation of the soil for planting an orchard depends largely upon its peculiarities. If heavy, it should be plowed deeply and subsoiled. If there is a hardpan subsoil, this should also be broken, which can be done by any good subsoil plow; in any event, the ground should be plowed deep and well stirred for ventilation. It is well, where practicable, to begin the preparation of the land for an orchard some time before the planting of it. It should be thoroughly and deeply plowed early in the

fall, leaving the surface rough and exposed to the air during the winter. This facilitates the access of air to the lower layers and gives vitality to the soil. Following in the furrow with a subsoil plow is desirable, especially in the conversion of old grain lands into orchards, as it breaks up the old hardpan which has probably formed through years of shallow culture. The preparation may continue through the following summer and, where practicable, hoed crops can be grown, or the land can be left to summer-fallow, care being taken to keep it thoroughly pulverized and free from weeds. If it is desirable to fertilize the land, manure can be applied in the winter before the trees are planted. If this is not done then, the work should be left until the trees are

planted, and the manure should be evenly spread over the surface during the winter, to be plowed under in the spring. Care should be taken to spread it evenly, and not mass it around the young trees, unless it is to be applied as a mulch to prevent evaporation after spring cultivation.

## Planting the Orchard

In laying off the orchard it is desirable to have it symmetrical and to economize the land. A little thought and care displayed at the commencement will save much annoyance in after years, and it is no greater task to have the orchard neat in appearance and symmetrical in outline than to have it in a haphazard condition. There are three objects to be considered in laying out the orchard: symmetry of appearance, economy of space and facility for future care. Of course, the first thing is to get the trees in straight rows, at equal distances apart, and everyone thinks he can accomplish this. But there are various methods of disposing of the straight row, and these methods all have their advocates and each one its advantages. The principal forms are the square, quincunx and the hexagonal or septuple. The methods most common in use are the square and the quincunx systems. The most generally adopted is the square system, as the orchard can be changed to quincunx after being planted, even after a number of years' growth.

## Planting Systems

In order that the most improved planting systems may be better understood, they are illustrated herein, to show how the orchard is first laid out and how the trees look after several years' growth.

### The Square System

This is the most approved system. The orchard is laid off in lines crossing each other, with equal intervals of space, and a tree planted at each crossing of the line. By the square method, at 20 feet apart, 108 trees are planted to the acre.

### Quincunx System

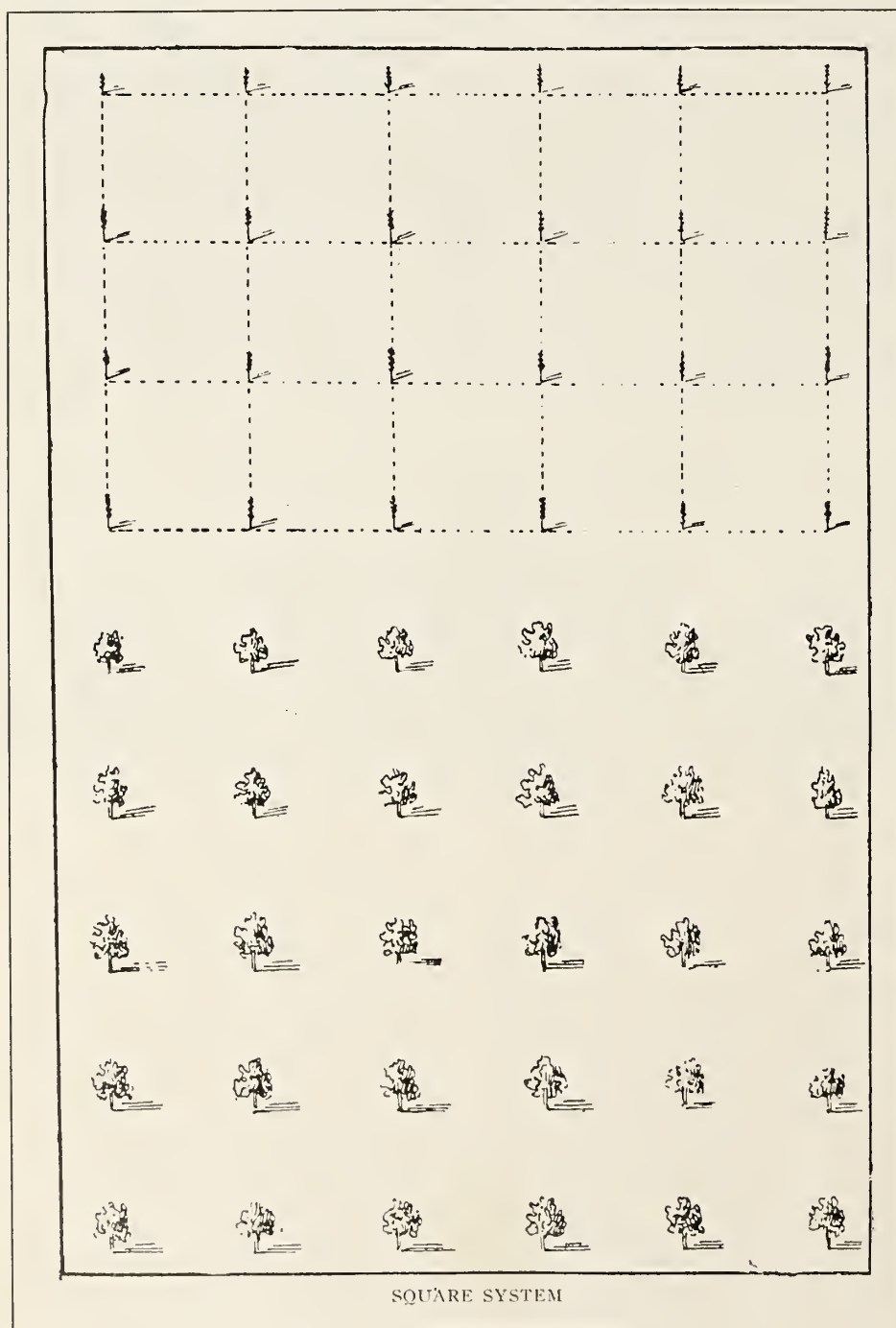
In this system the orchard is laid off in the same manner as for square planting, except that the number of rows are doubled—a tree being planted in the center of every square. This method is chiefly used in planting with reference to a future removal of the center trees, which are generally dwarf, when those designed to be permanent shall have attained a considerable size, and the orchard then assumes the square plan. At 20 feet apart, 199 trees are planted to an acre by this method.

### Hexagonal System

In this system the trees are equilateral—equal distance from each other—and more completely fill the space than any other system can. Six trees form a hexagon and inclose a seventh. The lines in the figure indicate the method of laying off the orchard. By this method, at 20 feet apart, 126 trees are planted to an acre.

### Triangular or Alternate System

In laying out an orchard by this system, the lines are run forming a square,





as in the square system; a line is then run diagonally across and a tree planted alternately, forming a triangle. The advantage in this system is that the trees are given more space and can be planted closer together without crowding.

The following table will show the number of trees to the acre by square, quincunx and hexagonal or septuple systems:

	Square	Hexagonal Quincunx or Septuple
10 feet .....	436	500
12 feet .....	303	347
14 feet .....	222	255
16 feet .....	170	195
18 feet .....	134	154
20 feet .....	108	126
22 feet .....	90	103
24 feet .....	76	86
30 feet .....	48	56

Note—In giving the distance of trees of the quincunx, the fifth or central tree is not taken into account.

#### Preparing the Trees for Planting

The broken or mutilated portions of the roots must be cut off, so as to leave the ends smooth and sound, and the ends of all the other roots should be pruned. From these ends the new fibrous roots usually start.

#### Planting

The hole must be large enough to receive the roots freely, without cramping or bending them from their natural position; the larger the better. Let the tree be placed two inches deeper than it stood in the nursery, the old mark can be readily discerned. The tree being held upright, the finest and best earth from the surface should be carefully worked among the roots with the fingers, filling every space and bringing every root in contact with it.

Set the tree as firm as a post, but leave the surface filling light and loose.

#### Mulching

This is done by placing a layer of coarse manure from three to six inches deep, extending one or two feet further in each direction than the roots. This protects the earth about the roots against drying or baking with the wind or sun, retains to it the requisite moisture and obviates all occasion for a practice—generally of injurious effects—the watering of newly planted trees.

#### Staking

If the trees are tall or in exposed situations, they should be supported by stakes to prevent injury from the action of the wind. Staking is done in the best manner by driving two strong stakes firmly into the ground, one on each side of the tree, about a foot distant from it, and fasten the tree between them with a band of straw or other soft material, so that it may be kept in an upright position, without chafing, till the roots obtain a firm hold upon the soil.

#### Pruning

The stems should now be put in condition for the formation of the top by removing all the limbs to the point where it is desired to have the top; then cut back each remaining limb, leaving from four to six buds of last season's growth. In the absence of any limbs suitable to form a top, cut the tree down to the requisite height, leaving the dormant buds to make the top.

The necessity of pruning vigorously at time of setting is generally a very unpleasant one to the planter, as it injures for a time the appearance of the tree to an unpracticed eye. It should

however, be unhesitatingly performed, all the branches to the extent of at least one-half the length of the previous year's growth being removed. Care should also be used to give proper form to the trees. The head may be left high or low, as the taste of the planter may prefer, or as the nature of the tree in some cases may require.

No stock planted in the fall should be pruned till the hard frost has left in the spring, but before the sap starts.

#### Peach Trees

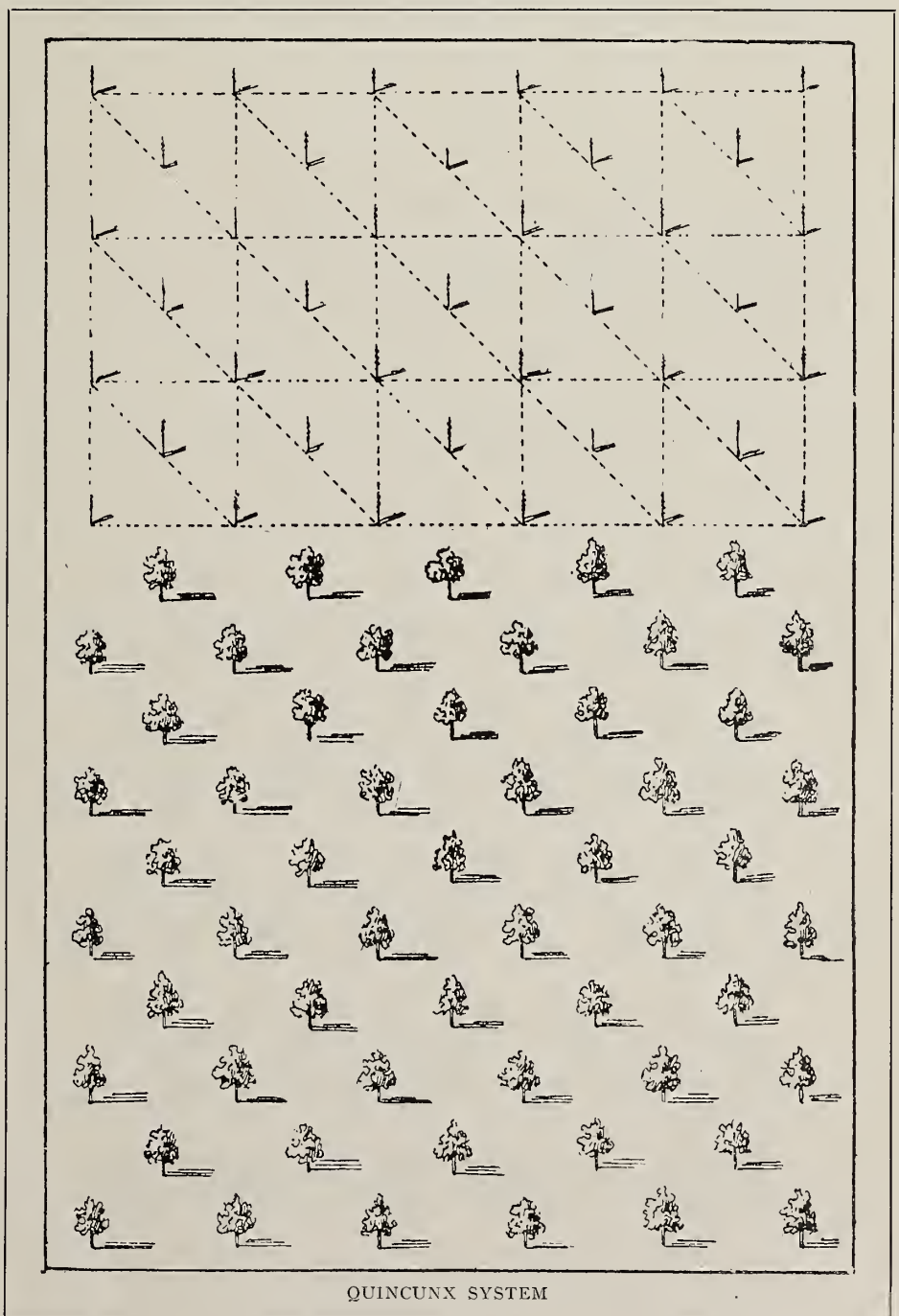
These should be planted immediately on their delivery, or, if not prepared to do so, the roots should be buried in the ground. They will not stand exposure to sun and air and many are lost simply for want of care. As soon as planted cut back all the side branches within two or three inches of the main stem. Make this the invariable practice

and never deviate from it if you wish to save your trees. The growth will be much more rapid and vigorous in consequence of this pruning, and by strictly adhering to it and by immediate planting or covering the roots in the soil, very few, if any, trees will be lost.

#### Cultivation and Training after Planting

Many cultivators, after taking trouble and expense in the selecting and planting of their trees, fail of success by neglecting that after-care and attention which is equally essential. Caterpillars and cankerworms, grubs and borers, slugs and aphids, disease and blight, must be watched for, fought against, and remedies faithfully applied. The wants of the growing tree must be carefully foreseen and a faithful effort made to insure health and productiveness.

The requirements of pruning vary somewhat, according to the kind of tree.



We prefer, however, low training for all trees. The pruning should be done each year, so that no necessity may arise for cutting large limbs. Care must always be used to keep the head of the tree open and well balanced, cutting the limbs which may be superfluous.

Trees should be trimmed as early as possible up to the height it is intended the future head should be, that the cutting off of large limbs may not in future be necessary. This should be avoided when possible, as decay is liable to commence at point of separation and extend into the trunk. When such removal is absolutely necessary, the wound should be carefully pared smooth and a covering of paint and grafting wax applied to protect it from the action of the weather.

Those who are obliged to plant trees in fields of grass or grain should see that all are carefully mulched with coarse manure and that the ground is

kept loose and moist about the trees. A hoed crop is greatly preferable in such plantations for the first five years. After this time, standard apple, pear, cherry and plum trees will grow and produce fairly in turf. Peaches should be well mulched every year with coarse manure and the ground thoroughly cultivated.

#### Summer Pinching

Those who are impatient to see fruit upon their trees, as is often the case, particularly with regard to trees tardy in coming to bearing, may expedite the fulfillment of their wishes by employing the process of summer pinching. In the month of July pinch off the ends of the young shoots; this retards for the time the flow of sap and hastens the formation of fruit buds.

#### Asparagus

To prepare a bed, dig the ground deep, incorporating large quantities of well

decomposed manure. Plant the roots about three inches deep, in rows 18 inches apart and one foot apart in the rows.

#### Grape Vines

Grape vines require a dry, mellow, well drained soil, deeply worked and well enriched, with a warm, sunny exposure. In planting, give the roots plenty of room; spread them out not more than six inches under the surface and settle the soil firmly around them. Soapsuds, sink water and urine are good fertilizers. There is nothing better than leaves and trimmings of vines buried around the roots.

#### Pruning

Vines, when set, should be cut back to within three or four buds of the root. In November, or early in the spring before the sap starts, in open culture, they should be pruned liberally. In pruning rather tender vines, leave more wood than is needed, as some may be killed, and finish pruning in spring as soon as leaves are fully developed, when the life of the vine may be seen. In summer allow a good growth beyond the fruit, and about midsummer pinch off ends of the branches to check them and cut out feeble laterals and branches on which there is no fruit; then there will be much foliage to absorb matter and prepare nutriment, and by checking the growth of wood it will be appropriated to perfect the fruit. Do not pick off the foliage. The leaves, not the fruit, should be exposed to the sun. We urge this point, as thousands mistake, and grapes are generally mismanaged. The two great errors are in neglecting to cut off useless wood in the fall or spring and in depriving the plant of necessary foliage by close pruning in summer. To obviate overbearing, reduce the vines by close pruning, so as to prevent much fruit from setting. If too much sets, thin it in season, that the juices of the vines may not be wasted on what must be removed.

#### Berries

Berries should have a strong soil and be kept under constant cultivation. Mulching is of special value. Raspberries and blackberries should have old wood cut off each year and new canes pinched off when three feet high. Strawberries should be mulched late in the fall; uncover crowns early in the spring; remove mulch after fruiting and spade in light dressing of manure. If set for fruit keep the runners off.

#### Currants and Gooseberries

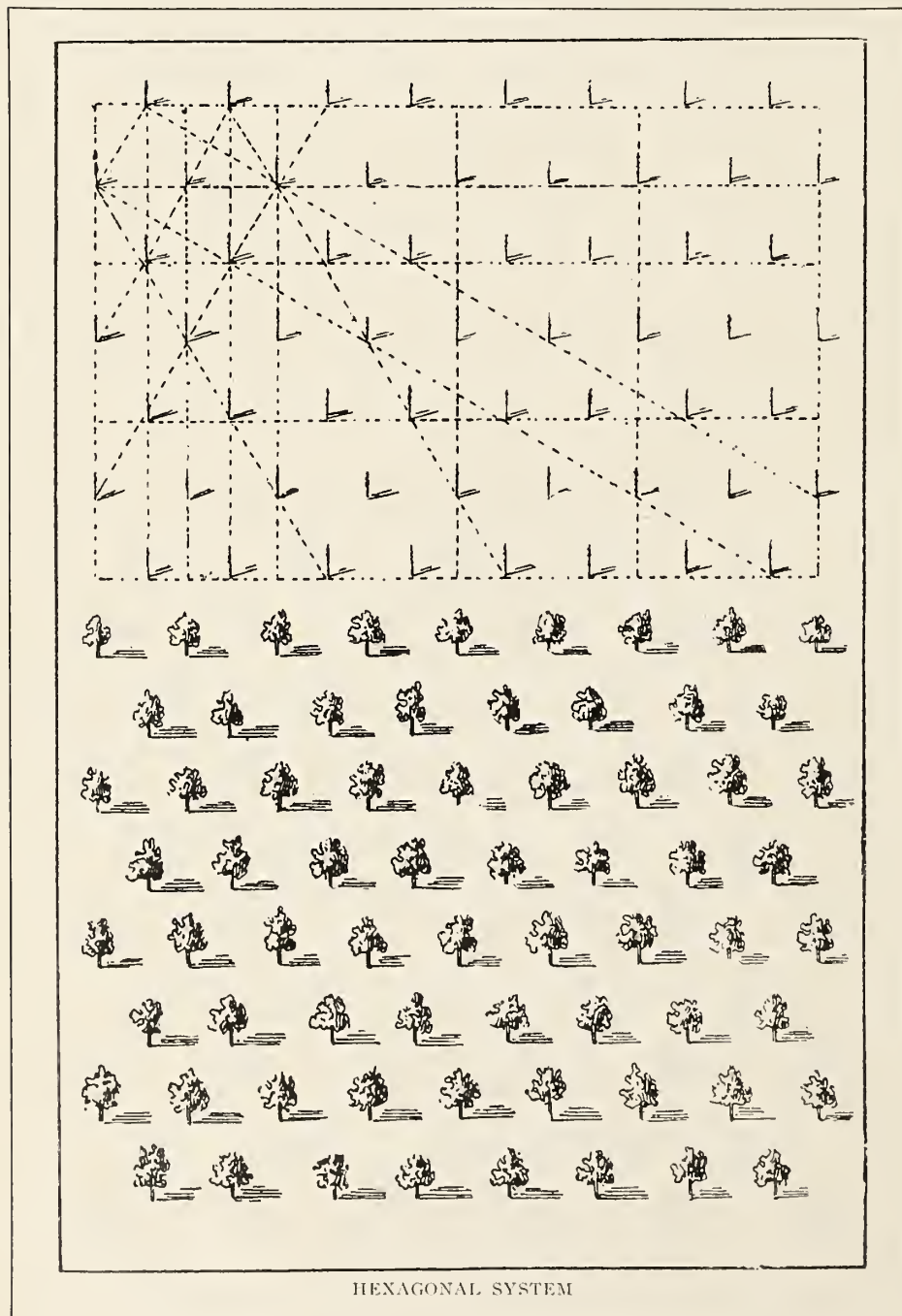
These need heavy mulching and pruning, so that new wood will have room to grow.

#### Roses

Roses should be planted in a deep, rich, well drained soil, so that the top roots are not less than two inches below the surface, and should be severely pruned every spring before the buds



FIGURE 2.—Properly planted; top properly pruned and put back, roots spread out. Sure to live.





start, cutting back the last growth to three or four buds, except climbing roses, which may first be allowed to partly cover the space desired. Old, decayed branches should never remain. Every autumn, compost should be placed around the stems of the plants and spaded into the ground the following spring. For planting grapes, berries,

currants and gooseberries, use the directions given for trees. Always remove the straw and moss from the packages before planting. Never put manure so as to come in contact with the roots of any plant or tree. Use only good soil around roots.

### Fall Planting

When set in autumn, a mound of earth a foot or more in height must be raised about the trees. This is essential, as it keeps them from being swayed by the winds or thrown out by the frost during the winter. It should be removed in spring. In sections where the winters are extremely severe, trees procured in the fall can be best cared for by covering

the roots with earth during the winter and planting them in the spring.

To insure success, select a spot where no water will stand during the winter, having no grass near to invite mice. Dig a trench deep enough to admit one layer of roots and sloping to permit the trees to lie at an angle of not more than 30 degrees with the ground. Having placed one layer of the roots in this trench, cover them with mellow earth, extending well up on the bodies, and see that this is firmly packed. Then add another layer of trees, overlapping the first (and continuing as at first until all are heeled in. As soon as this is done, cover the tops so well with evergreen boughs that they will be thoroughly protected from winds.

Figures 1 and 2 show the right and wrong way to plant trees. Plant and trim according to Figure 2 and you will have no trouble in making trees grow.

Be sure to remove label before tree begins to grow, or it will be fatally injured through strangulation.

The above illustration presents vividly the difference between correct and incorrect planting. In Figure 1, too small a hole has been dug and the roots have been crowded into it in such a way that if the tree lives at all it will be at the cost of a great effort and loss of vitality.

This is the method which is commonly practiced, and we cannot, therefore, too strongly warn against it.

The roots must have plenty of room, and great care should be exercised to have them as nearly as possible in the same position which they occupied in the nursery.

In Figure 2, the roots occupy this position, being carefully arranged, and the top has been properly trimmed, regardless of the great injury to the present appearance of the tree. In trans-

planting under the most careful management, so many of the fibrous roots which carry nourishment are destroyed that it is very essential that the top be correspondingly removed.

### Number of Trees or Plants on an Acre

Distance apart each way	Square Method	Hexagonal or Equilateral Triangle Method
1 foot .....	43,560	50,300
2 feet .....	10,890	12,575
3 feet .....	4,840	5,890
4 feet .....	2,725	3,145
5 feet .....	1,745	2,010
6 feet .....	1,210	1,600
8 feet .....	680	785
10 feet .....	435	505
12 feet .....	305	350
15 feet .....	195	225
16 feet .....	170	190
18 feet .....	135	155
20 feet .....	110	125
25 feet .....	70	80
30 feet .....	50	55
35 feet .....	35	40
40 feet .....	27	31
45 feet .....	21	25
50 feet .....	17	20
55 feet .....	14	16
60 feet .....	12	14

**RULE—Square Method—**Multiply the distance in feet between the rows by the distance the plants are apart in the rows, and the product will be the number of square feet for each plant or hill, which, divided into the number of feet in an acre (43560), will give the number of plants or trees to the acre.

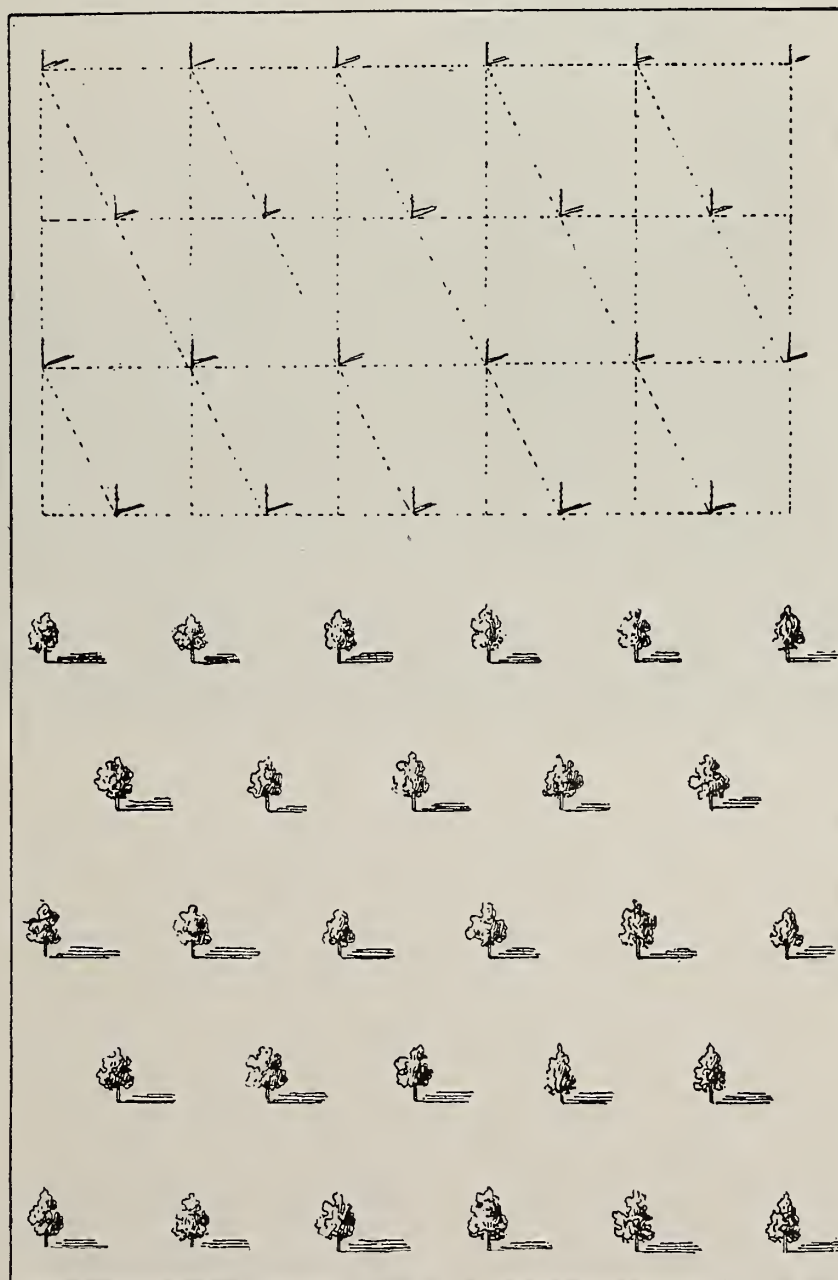
**RULE—Equilateral Method—**Divide the number required to the acre "square method" by the decimal .866, or calculate the number by the "square method" and add 15 per cent. The result will be the number of plants required to the acre by this method.

### Distances for Planting

	Each Way, feet.
Standard apples .....	30
Standard pears and strong-growing cherries .....	20
Duke and Morello cherries .....	18
Standard plums, peaches, apricots and nectarines .....	16 to 18
Dwarf pears .....	10 to 12
Dwarf apples .....	10 to 12
Quinces .....	10 to 12
Currants and gooseberries .....	4
Raspberries and blackberries .....	3 to 4 by 5 to 7
Strawberries and field culture .....	1 by 3 to 3½
Strawberries for garden culture .....	1 to 2
Grapes .....	7 to 16 feet in rows; rows 10 to 16



FIGURE 1.—Improperly planted; top left without pruning and roots crowded together. Sure to die.



TRIANGULAR OR ALTERNATE



# THE ESSENTIALS IN PLANTING AN APPLE ORCHARD

BY PROFESSOR J. R. SHINN, UNIVERSITY OF IDAHO AGRICULTURAL EXPERIMENT STATION

**B**EFORE planting an apple orchard the prospective orchardist should understand some of the requirements that must be satisfied if he is to be a successful fruit grower. Without a doubt a successful orchardist should have a general training in the sciences, such as chemistry, botany and entomology, for their application are intimately associated with the everyday affairs of the business. A knowledge of chemistry will aid him in preparing and applying fertilizers and in making spray mixtures. A knowledge of botany is

ability of the planter and the purpose for which the fruit is grown. In a commercial planting it is obvious that an inexperienced man should confine his attention to fewer acres than the man of greater training and experience, though this principle is very often reversed in practice. The management of details, as has already been stated, is the important consideration; to do this properly, personal attention is absolutely necessary. Subordinates are usually delegated to look after much of the work where the area devoted to the orchard is large,

permits proper maturing of the apple. In favored sections apples are now grown at an elevation of 6,000 feet, but it is rarely advisable to plant an orchard above 5,000. The greater percentage of the profitable commercial orchards at the present time are in sections where the elevations are below 3,000 feet.

Another all-essential element in locating a commercial orchard is to select a region where there will be ready transportation facilities.

In connection with the selection of a section where market communication is



LIBERTY ORCHARD, HOOD RIVER, OREGON, SHOWING HOOD RIVER STYLE OF VASE-SHAPED TREE, PRUNING AND CULTIVATION

essential; this knowledge must be used in keeping posted on plant diseases and the latest methods of handling them. An understanding of economic entomology should also form one of the foundation blocks in the apple orchardist's equipment, for he should be able to recognize every insect that infests or is likely to infest his plantation. The business aspect of apple growing is such that it is necessary that the successful orchardist should be well informed in business systems and business principles, insofar that he may buy his supplies to the best advantage and reap the greatest returns from his crops. This latter point can scarcely be over estimated, for experience has shown that a good business man coming from another profession generally proves one of the most successful apple orchardists. Another all-essential requirement of the successful apple orchardist is that he be a good farmer, understanding the management of teams, tools, plows, harrows, etc., and the proper manner of preparing the land.

## The Size of the Orchard

The size of the orchard to be planted will depend upon the experience and

and the subordinates are generally far below the owner in their qualifications. The various operations of spraying, pruning, cultivating, harvesting, etc., should be well done and at the most opportune time. Delays of a few days in one or more of these operations may mean a failure in all. This is especially true of spraying in overcoming the ravages of the codling moth or apple scab, as many growers have experienced. Chiefly because one man can give his personal attention to a small area only, it is important that the acres set to apples be few. Indeed, it may be stated that a planting of ten acres for commercial purposes is ample for the beginner. However, sufficient quantities of fruit should be produced by the grower to enable him to ship in car lots, since he is located at such a great distance from market.

## Locating a Commercial Orchard

The proper location of a commercial apple orchard is no small task, as there are many problems involved. Above all things in selecting a location for a commercial orchard, it is essential that a locality is chosen where the elevation

guaranteed, advantage should be taken of locating where there are two or more ways by which the fruit may be taken to market. Either two different lines of railroads or a railroad and waterway are decidedly advantageous. These competing lines have a tendency to reduce the freight rates much below those usually maintained where one public carrier has a complete monopoly of the entire shipping facilities.

The finished product of an apple orchard will not endure rough handling if it is to be highly remunerative, hence it is desirable that an orchard should not be in a locality where long rough hauls by wagons are necessary to reach shipping points.

Whether a location shall be selected in a newer or older apple producing district is a perplexing problem for many prospective planters. Each district has its advantages as well as its disadvantages. The former will have the great advantage of affording cheaper land. On the other hand, the fruit growers of the older districts are usually more thoroughly organized and have worked out systems for producing and handling



their apples which must be accomplished in every new community if the business is to prove highly successful.

If one has plenty of organizing and business ability and is an apt scholar in gathering and applying information, it can readily be seen that a new locality may afford the greatest opportunity.

### The Site

Careful attention should be paid to the selection of a site for an apple orchard. Where choice is permitted, it is always important that the orchard should be somewhat elevated above the immediate surrounding country, in order that free air-drainage may be secured and late spring frosts thus avoided. Cold air is

age. Sloping land also tends to provide good water drainage, which is an essential consideration. Fruit trees are short lived, grow slowly, crookedly and often have a twisted trunk on land which is too wet.

Northern or eastern slopes are generally regarded as best for apple orchards, owing to the fact that they are later in warming up in the spring than slopes in other directions. This condition results in retarding the blooming period of trees, which is often sufficient to avoid injury from frost in many seasons. In most sections it may be desirable to select a slope away from the strong, prevailing winds, as such winds do untold damage to both crops and trees;

sections where the growing season is short and where the fruit is likely to be poorly colored, a southern exposure may be preferable to all others. In the higher altitudes of the state these factors should be borne in mind as highly significant; any element that will prolong the season for late winter apples and induce them to take on their full degree of color should be favored. With the early winter varieties, grown in the section mentioned above, the northern or eastern slope usually permits the fruit to properly mature and to become well colored. However, owing to the fact that the soil on the south exposure is drier, it naturally follows that the fruit produced will be smaller, unless some means be de-



GLIMPSE OF HOOD RIVER VALLEY, OREGON, WITH MOUNT HOOD IN THE DISTANCE  
Along the line of the Mount Hood Railroad, showing orchards of William Fike, C. T. Roberts and Dr. Stanton Allen

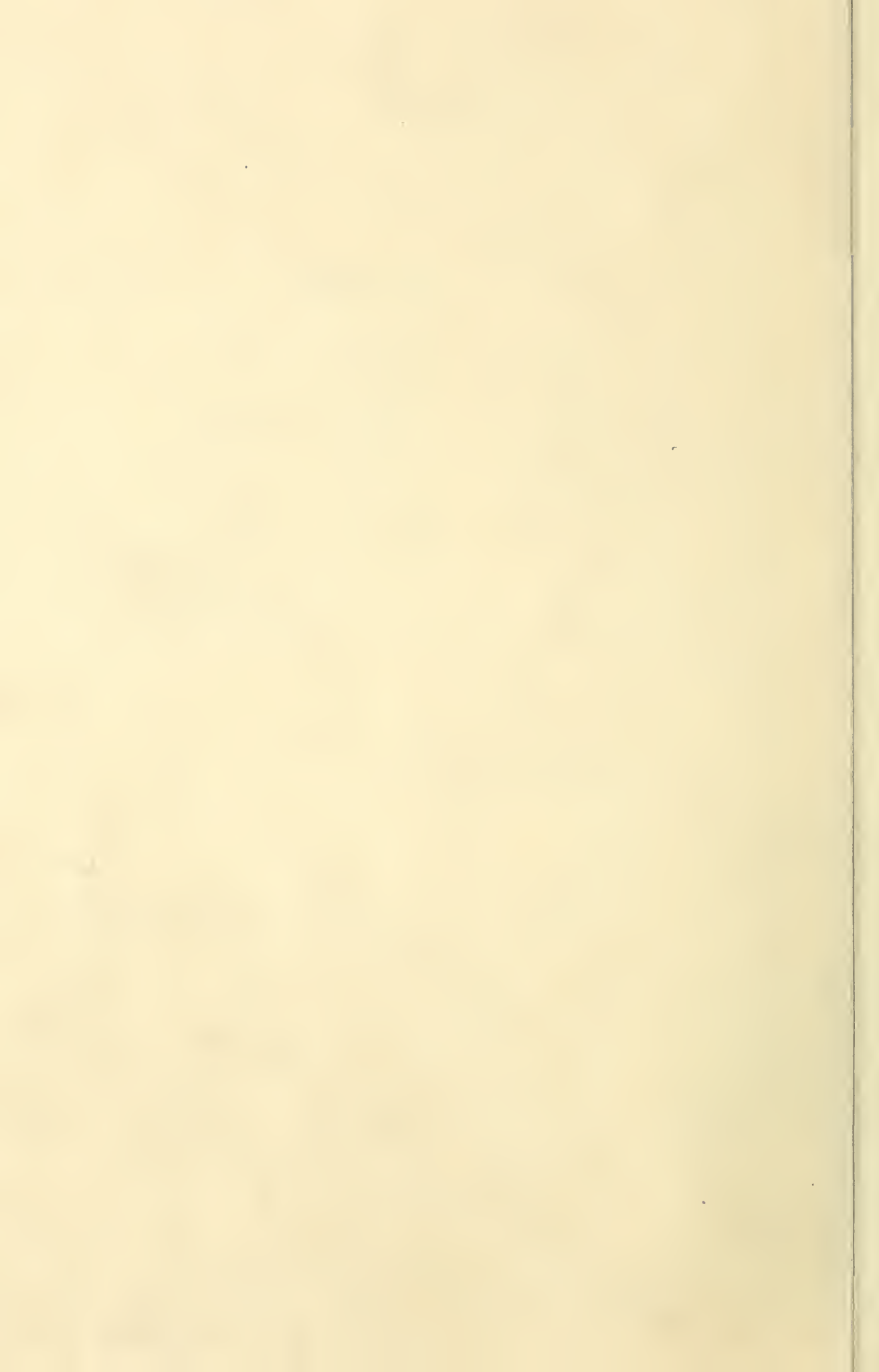
heavier than warm air; it therefore slides down the hillsides into the valleys. This condition, which permits the cold air to settle away, is said to provide air-drainage—a factor of extreme importance to the apple orchardist. For this purpose, gently sloping land is preferable to level land, though in irrigation sections it is more difficult to water. A fall of two or three feet to every hundred is very satisfactory and will aid materially in keeping the plantation free from the ravages of late spring frosts. On the other hand, too steep slopes should be avoided, for the reason that they cannot be tilled, irrigated and sprayed satisfactorily. A greater factor in facilitating air-drainage is a draw or gully passing through or near the orchard. This element should be taken advantage of where conditions permit. An orchard should never be placed in low lying basins or "pockets," for such positions are devoid of proper air-drain-

ages to the north or east generally satisfy this condition. Moreover, the soil on the northern and eastern slopes is usually deeper and richer than that found on slopes to the south or west. The reason for this condition is due to the fact that fine, rich dirt, leaves, straw and various materials are gathered from the southern and western slopes by the prevailing westerly winds and deposited upon slopes in the opposite directions. The continued deposition of this material has added much organic matter to this leeward soil, which has resulted in producing not only a rich, deep soil, but also one capable of retaining moisture.

On the other hand southern slopes are earlier and therefore permit a longer growing season. Besides, trees situated on such exposures receive large amounts of sunshine, which results in earlier maturing fruit, with higher color and sometimes with better flavor. From these conditions it is obvious that, in

viewed to overcome this obstacle. With the proper application of manure and the intelligent use of cover crops on such soils, this difficulty may be largely obviated. Subjected to such treatment, a southeastern cove may be regarded as the best site for the higher altitudes. This kind of a site, properly chosen, may combine not only the warmth of the southern exposure, but the deeper, richer and more moist soil of the northern slope may also be secured.

Large bodies of fresh water, either lakes or rivers, exercise an ameliorating influence upon the climate in their immediate vicinity, and orchard sites selected on slopes which extend towards the water are more immune from radical atmospheric changes. The slope on the side towards which the prevailing winds blow is preferable, because the air in passing over the water becomes modified in temperature and its moisture content is increased. These latter con-





ditions make such sites warmer in winter and cooler in summer, besides they tend strongly to prevent the occurrence of late spring frosts.

#### Soil

Soils from which native forests have been cleared are best adapted to growing the apple. These are in good physical condition, so that ample surface drainage and sub-drainage are supplied; besides they have a plentiful supply of plant food, which is essential to a

state of cultivation. After the roots of the trees have taken possession of the soil, deep plowing cannot be done, and, as this is essential, the soil should be plowed deeply before planting. For arid lands in sagebrush sections the need of organic matter in the soil is apparent to the casual observer, and no crops act so beneficially in increasing this organic matter as alfalfa or clover. After clearing new lands, alfalfa or clover may be sown, which should be allowed to remain one or two seasons,

penetrate in a way that could never be secured after the roots occupy the soil.

#### Time to Prepare Soil

The autumn months are regarded as the best time to prepare all lands that are to be planted to apple orchards. This exposes the land to the ameliorating effects of frosts, allowing such soil to catch and hold the rainfall of winter, and permits the subsoil to become sufficiently settled to re-establish capillary action between it and the lower soil strata while still keeping the soil in loose condition for the deep penetration of the roots. If the autumn preparation is thoroughly done, the stirring of the surface is all that will be needed in the spring.

#### Drainage

Aside from the fact that under-drainage is desirable in carrying off surplus water from the soil, it has many other beneficent qualities, only one of which needs mentioning in this connection. Arid places under irrigation, unless possessing good natural drainage, are prone to become alkaline in the course of time. This condition is due to the fact that all fertile soils contain alkaline salts to a greater or less degree. These salts are readily dissolved by the water entering such soils. As most water must pass off eventually, either through the plant or by evaporation, there is a marked accumulation of these salts in the surface layers of the soil, such material being dissolved in the lower strata and then left behind at the surface when the water is used by the plant or is evaporated. Under-drainage is the great preventive as well as the sovereign remedy for alkali. Complete saturation of the soil with water once a year and provision for under-drainage to carry away the surplus, means that the excess of these salts will be washed out and removed entirely.

As stated before, natural drainage is the most desirable for orchards, but where it does not exist, tile drainage should be resorted to. In soils that are loose and crumbly tiles may be laid thirty to sixty feet apart, while on heavy, impervious soils less distances should be allowed. All tile drains should be placed below the frost line, and it is questionable whether it is advisable to place them at a depth less than three feet in an apple orchard. It should be remembered that tile drains among fruit trees are liable to become choked with tree roots and must be dug up and cleaned out as often as a diminished flow of water is noted.

#### Irrigation

Where irrigation is practiced, the method that is to be used in irrigating the orchard should be considered before the trees are planted. Of course,

before the ground is plowed, preparatory to planting, it should be watered sufficiently to make the plowing easy, but the system thus used may not always correspond to the one to be used after the trees occupy the land. Undoubtedly the furrow system of irrigation is the best method. Mr. Elias Nelson, irrigationist for the station, gives the following directions for the installation of this system: "To install the furrow system the procedure is as follows: When the conformation of the land permits it, the head ditches are located three hundred to five hundred feet apart and at right angles to the furrows. When they must be made on contours, they should have a grade of one and three-quarters to two and one-half inches to each one hundred feet, and their distance apart be such that the furrows are three hundred to five hundred feet long. Check boxes are placed in the head ditches at such distances apart that the splash board will raise the water high enough to flow readily into all the furrows. The splash boards are so adjusted that the excess water in each section flows into the next below, until the whole head of water is being distributed. Each head ditch below the highest one catches the water from the furrows above it and redistributes it. To divert the water from the head ditches, small gates or lath tubes are placed in the ditch bank. Spouts one and a half to two feet long, made of lath, will usually supply sufficient water for each furrow. However, when a larger stream than the lath spouts divert is needed, tubes may be made of half-inch lumber of the proper width. The spouts are placed in ditch banks just below the surface of the water. When the splash boards are in place the water will flow through the spouts, and when any section of the orchard has received suffi-



BLOCK OF COMICE PEARS OF THE ORCHARD OF W. J. PERKINS, MEDFORD, OREGON. RECENTLY SOLD FOR \$75,000

cient water the boards are removed and the water then drops below the level of the spouts. In porous soil the furrows should be three hundred to four hundred feet long. In soil that does not absorb water readily they may be much longer and a smaller stream of water should be run for a longer time. The automatic feature of the system and the even distribution of water which it insures, makes it very advantageous. Flooding should never be practiced in orchards, nor should water ever be allowed to come in contact with the trunks of trees."

#### Heel in the Trees on Their Arrival

Trees, when delivered in the fall, may be "heeled in" by the planter and carried through the winter in first class order. Care should be exercised to select a

well drained and protected place on which they are to be "heeled in." It is best to secure this place near the area to be planted, so that the trees will be convenient at planting time. This practice of "heeling in" consists of plowing a deep furrow in which the roots are buried. Where the trees have an exceptional spread of roots it is necessary to increase the depth of the furrow by digging, in order that all the roots may be placed below the level of the surface. The trees should be arranged singly, side by side, with the tops laid down almost horizontal and all tops laid in the same direction (preferably pointing to the north). After a single row of trees has been distributed along the furrow, loose moist soil must be thrown over the roots, so that every root is brought in close contact with the soil.



EISMAN ORCHARD, GRANTS PASS, OREGON

healthy wood growth and a finely developed, well matured crop of fruit. It has been repeatedly noted that fruit from such soils reach the highest degree of perfection, both from point of quality and color. However, soils which may be brought to a state similar to that found on old forest sites, may be regarded as being well adapted to the growth of the apple. Medium clay loams adapt themselves admirably to the apple, and if these possess, or are made to possess, the following requisites, orchards may be planted upon them successfully. These important requisites are: good water drainage, good texture and sufficient richness in plant food. As suggested in a preceding paragraph, a sloping site usually affords good water drainage, but this is not always the case. Where good natural drainage is not found, tile drainage should be provided, because apple trees will not endure "wet feet." The phrase "good texture" means that a soil possessing this characteristic will work up loose and mellow without being hard and lumpy. Such soils are easily worked and hold plenty of moisture.

#### Preparation of the Land for Planting

After the site and soil have been selected the subject of the preparation of the land for the reception of the trees should occupy the attention of the orchardist. An apple orchard is very different in its requirements than are annual crops. Anticipate planting two or three years in advance and devote this time to growing a rotation of crops which will bring the soil into the best

after which it is turned under. By virtue of their extensive root systems better crops than these are not known for breaking up soils underlain with stiff clay. New ground, however rich, needs to be subdued before trees are set upon it. Such lands are apt to be full of inequalities. Remedy the poor spots that need manuring and the wet spots that need drainage, so that the trees when planted may grow evenly and rapidly. The cereal crops, such as wheat and oats, serve admirably as indices for bring out these inequalities. Immediately preceding the planting of the orchard, a crop that requires thorough cultivation, such as potatoes, is highly beneficial in putting the finishing touches upon this preparatory cropping system.

#### Subsoiling

Subsoil plowing should be resorted to in all cases where the lands are underlain by a stiff stratum of soil. This is accomplished by running a subsoil plow in the furrow left by the ordinary breaking plow, loosening the soil to an additional depth of twelve to eighteen inches. Treating soils in this manner not only deepens them but promotes good drainage and increases their water holding capacity. It is not always essential that the whole area of the ground be subsoiled before the trees are set. A strip of six or eight feet wide, on which the trees are planted, furnishes a sufficient subsoiling for the first year. This subsoiled area may be increased by subsoiling a strip three to four feet wide on each side of it annually, until the whole space is covered. This practice stirs the ground deeply for the roots to



BEAR CREEK ORCHARD OF C. HUNT LEWIS, NEAR MEDFORD, OREGON, RECENTLY SOLD TO EASTERN PEOPLE FOR \$160,000



excluding the free passage of the air. The topmost roots should be buried to a depth of four to six inches. Where large numbers of trees are needed, rows are arranged so that the tops of each succeeding row overlap the "heeled in" roots of the preceding. Before trees are "heeled in" in the fall, it is usually advisable to cut away all broken and bruised roots and to thin out other roots that crowd and interlace. Trees treated in this manner will have callouses formed over all cut surfaces by spring, and will be in excellent condition for planting. Where mice or other vermin are not present it is safer to mulch the tops of the trees during winter rather than leave them exposed.

chief reasons advanced by the former are, that the roots of trees set in the fall become thoroughly established in the soil, and that all cut surfaces on the roots become calloused during the winter, which results in new roots pushing out early in the spring. On the other hand, dry falls and dry winters will prove fatal to many fall-set trees and the stand will therefore be imperfect. Early spring planting may be regarded as the safer rule.

**Treatment of Trees at Planting**—The treatment of apple trees at planting time has a very great influence upon their future welfare. Many orchard planters set trees in their permanent position without applying the least amount of

fact, even a greater amount of the top should be removed than that removed from the roots, since the latter must become adjusted to their new quarters before their activities begin, while the former experience no radical difference in this respect. With yearling trees, the necessary pruning for establishing low-headed trees will reduce the top sufficiently. It is best to postpone the pruning of the tops until the trees have been set, at which time they are cut down within eighteen or twenty inches of the ground.

**Digging the Holes**—Holes for apple trees must be large enough to accommodate all the roots and deep enough to allow the tree to set three or four inches deeper than it stood in the nursery. An error committed by most tree planters is to plant too shallow. Deep planting develops a deeper rooting system and affords a better anchorage. In removing the dirt from the hole, that taken from the top-most six inches should be placed on one side, while that taken from the lower depths should be placed in a separate pile. The reason for this is that the surface soil is better adapted for placing in contact with the roots. The bottom of the hole should be thor-



SALEM, OREGON, MUTUAL CANNERY, WHERE FRUIT IS CANNED BY THE CARLOAD

If roots have become dry in transit they should be thoroughly soaked with water before they are heeled in. A tub of water may be used for this purpose and while one bundle is being heeled in another is allowed to soak in the tub. Care should be exercised to remove all packing material from the roots, for such material permits too much air. Each variety should be placed by itself, properly labeled and a record kept in a book of the position that each occupies.

While this "heeling in" practice has been described as a method for keeping fall delivered stock, it should be said that it applies with equal importance to spring deliveries. Where the ground is not in perfect readiness for the planting of the trees upon their arrival, the latter should be unpacked at once and "heeled in." In fact, the instances are rare in which "heeling in" should not be regarded as the only rule to follow.

#### Planting the Trees

**Time of Planting**—Much difference of opinion exists between the best authorities as to the season for planting apple trees. Late fall planting is advocated by some, while others are equally certain that early spring planting is better. The

rational treatment to them. For example, trees are planted in the orchard in the same condition as they are received from the nursery. At the close of the first season, the owner is much troubled to learn the reason for the poor growth and in many instances the utter failure of his trees.

**Prune the Roots**—The amount of root surface that trees have when they leave the nursery row is usually about half as great as they possessed normally. Further than this, it is always advisable to thin out all crowding and interlacing roots and to cut away all broken ends of those remaining. Apple trees require a certain amount of root pruning before they are planted in order to get the best results. The opportune time to do this pruning is in the fall, but where the trees do not arrive until spring, root pruning should be administered before the trees are planted.

**Prune the Top**—Since the tops and roots of trees are mutually dependent, there is a nice balance between these parts as they exist normally; consequently it appears reasonable to believe that where a portion of the roots has been removed, a similar amount of the top should also be pruned away. In

oughly loosened with the spade, after which some of the surface soil is thrown in before the tree is placed in the hole.

**Filling the Hole**—After the tree has been placed in its exact position by means of a tree locator or by sighting, the roots are spread out evenly in all directions and then the hole is filled. The first dirt put into the hole should be the rich soil from the surface, worked tightly under and between the roots by using the fingers. Slightly moving the tree up and down will aid in getting the soil under the roots. The hole is then filled half full of surface soil and tamped down firmly; after this the hole is filled to the top with the other soil and again tamped. A few shovelfuls of loose dirt or a few forkfuls of manure thrown about the tree to prevent the loss of moisture, completes the operation.

The question is very often asked regarding the advisability of placing manure in the bottom of the hole. A forkful of fine, well rotted manure placed in the bottom of the hole may often prove beneficial, but coarse manure should never be used in this manner because it will heat and scald the roots. Spreading manure on the surface about the tree is regarded the better practice.



## THE INDUSTRY OF MAKING LIME-SULPHUR SPRAY

A RECENT photograph, reproduced herein, of the large spray plant in course of construction by the Hood River Spray Manufacturing Company, at Hood River, gives a glimpse of the importance of an industry auxiliary and necessary to fruit growing in the Northwest.

The Hood River Spray Manufacturing Company is putting up this plant under an arrangement with the Oregon Spray and Gas Company, the originators of the celebrated lime and sulphur spray known under the trade name "Niagara." A plant like it but of not so great capacity, has recently been completed at Medford, to be operated there under the management of J. A. Perry, the well known manager of the Rogue River Fruit Growers' Association, and one of the most successful fruit growers in Southern Oregon.

The combined system, comprising the Oregon Spray and Gas Company, the Hood River Spray Manufacturing Company and the Medford Spray Factory, and projected plants at North Yakima and in California, are under the management of F. A. Frazier, of Portland, who has recently established headquarters at Hood River.

The Hood River plant embodies all the up-to-date appliances in the way of large steel tanks, mixers, agitators, settling tanks, etc., which are the outgrowth of the experiments and accomplishments during the past three years on the part of the promoters of this enterprise.

Hood River Valley, Mosier, The Dalles, White Salmon and Underwood afford a good and increasing market for the product of this plant, but it is intended to ship out from Hood River in all directions. A large part of the output will go into the Yakima Valley until the concern gets its plant in there, while other parts of Oregon, Idaho, British Columbia, and even Montana and more distant points, will draw heavily on this plant.

Lime and sulphur spray has come to stay, and while it should not be called a cure-all, it has many virtues, some of which are not yet fully understood. Its value as a destroyer of San Jose scale and kindred pests is past question, and many leading fruit growers have come to recognize in lime and sulphur a splendid tonic and all-around cleaning-up spray which justifies its application at least once a year.

The commercial preparations, when properly made, have many advantages over the home make, chief of which is certainty of a known strength, enabling its use in an exact way for any purpose, its convenience and readiness for use at any time and the saving of a very disagreeable task in making for one's self. All considered, and when the price is reasonable, there should be every incentive for the use of the commercial spray as against the home making.

The spray manufacturer and fruit grower should see in each other co-

on the basis of a circle, the distance between the trees being equal to the radius of the circle. Thus we have six trees in a hexagon, with one tree in the center. The advantage of this method is that the trees are all equally distant, but its disadvantage is that if the trees are set too closely they cannot be easily removed to advantage, for, if you take out any trees it will still leave some trees crowded, while other parts of the orchard will have large spaces. The third method is the quincunx—one rarely used, but probably the best of all. By this system, four trees constitute a



HOOD RIVER SPRAY MANUFACTURING COMPANY'S LIME-SULPHUR PLANT

workers, and while the spray man has spray to sell he is different in kind only to the man who has apples to sell. We are therefore glad to see the enlarging of an enterprise like the Hood River Spray plant, which can be of incalculable value throughout the Northwest in the production of better fruit, cleaner fruit and such as will continue to take first place in the world's markets.

### PRINCIPAL DETAILS IN STARTING AN ORCHARD

Continued from page 21

planted in rows six feet apart and eight to ten feet apart in the row.

There are several systems of setting out an orchard. The first is the rectangular or square method, in which the trees are set in squares. The chief advantage of this system is that it enables easy cultivation to be done. Its disadvantage is that the trees are not all equally distant, the diagonals being greater than the sides. The second system is the hexagonal. It is set out

square and a fifth is set in the center of each square. The orchard can be set out with the idea that the square will be the permanent planting and that the fifth tree, in the center, will be removed when crowding occurs. This center tree can be some early-maturing tree, like Wagner. The following table shows the number of trees per acre by each system:

Distance apart	Rectangular	Hexagonal	Quincunx
12x12 feet	303	348	523
15x10 feet	290	...	...
15x15 feet	193	217	347
20x15 feet	145	...	...
18x18 feet	134	142	247
20x20 feet	108	124	199
25x20 feet	87	...	...
25x25 feet	70	81	126
30x30 feet	48	55	83
35x35 feet	36	41	45

In conclusion, I would state that before setting your trees you should cut off all injured roots with a sharp knife, cut back dried or weak roots, set your trees in a hole ample enough to accommodate the roots and about three inches deeper than it was in the nursery. Be sure to have your trees well lined and head them low.



## THE PROPER TYING UP OF LIMBS OF YOUNG TREES

**M**R. A. I. MASON, of Hood River, Oregon, in a lecture on "Planting and Care of an Orchard," recommended that trees be planted six inches deeper than in nursery, so that in cultivating the orchard, the mainstay of the trees, the top roots, be not injured and that the trees be headed twenty inches high. He said:

"The maximum acreage in orchard which the average farmer can manage is twenty acres. For breaking up the ground use a disc, never a plow. The

eter. The rings in the several limbs can be bound together. This makes them self-supporting. To these principal limbs the lower limbs can be tied. In an overloaded orchard treated as above, only two limbs broke during the season. In picking, thinning, pruning and tying limbs great care should be taken not to destroy fruit spurs intended for next season's crop. The most profitable crops grown on Hood River are Spitzenberg, Yellow Newtown, Pippin and Ortley apples in the order named.

or in the fence corners. In picking I prefer pails just wide enough to set down into an apple box. Boxes to be packed with apples should be clean—free from finger marks—and have a beautiful label. We wipe every apple and wrap it in paper before placing in the box. Apples are placed in three grades, according to their size. The variety of apples and the number in each box is stamped on the box. The proper time for picking apples is when they begin to drop. We must raise



SCENE IN FREMONT WOOD'S ORCHARD IN BOISE, IDAHO, SHOWING CLEAN CULTIVATION

latter catches and destroys too many of the top roots. When the bark of the trees begin to get rough, scrape off the loose bark and wash with soft soap. Apply with an ordinary corn broom. Do not paint wounds. The wood always decays under paint. Cover wound with wax. Use this formula: One pound of tallow, two pounds of beeswax, four pounds of rosin. Melt together. Thin when necessary with turpentine. Grafting should be done when tree is in bloom. Use scion with two buds, cut it wedge shape with shoulder on one side. Insert between bark and wood of tree down to shoulder of scion. Never split the wood. Decay always starts when the wood is split. Prune the trees to the shape of a wine glass.

"To hold the limbs of young trees in shape wanted, use two-ply, soft spun American hemp, tarred. To keep trees from breaking down, insert screw-eyes in limbs ten feet from ground. Attach a No. 12 galvanized wire to the screw-eye; twelve inches from the screw-eye cut the wire off and fasten it to a solid galvanized iron ring one inch in diam-

"You can clear your orchard of scale and codling moth by properly spraying. I do not have one per cent of wormy apples. You must keep the ground clean and free from trash. Nothing must be allowed on the ditch banks

fancy apples for New York and the cities of Europe. There can never be an overproduction for this market. Of the common poor stock and varieties we may never see another year that it will pay to raise them."

## THE PRINCIPLES OF PRUNING MADE PLAIN

**P**RUNE to modify the vigor of the plant, giving it less top to support, allowing the sap to flow into the remaining branches.

2. Prune to produce larger fruit than could be produced if the vital forces of the tree were divided among a greater number of branches.

3. Prune to give the trees desirable shape.

4. Prune in summer to change the trees from wood bearing to fruit bearing.

5. If the tree bears too much fruit, prune heavily in winter, so that the tendency will be to wood growth.

6. Prune to remove surplus parts or injured parts or parts that interfere with each other.

7. Prune to facilitate spraying or har-

vesting. In pruning for this purpose, generally clip off the top of the high growers.

8. Prune to facilitate tillage. It is exceedingly difficult to keep an orchard clean from weeds unless we can drive a team under the branches—Ex. Station, Colorado. ♦ ♦ ♦

**T**HE following figures are those of the United States Department of Agriculture, and show the decrease in the apple production of this country during the twelve years ending 1907:

Year	Barrels	Year	Barrels
1895	60,540,000	1902	47,625,000
1896	69,070,000	1903	45,000,000
1897	41,536,000	1904	45,300,000
1898	28,570,000	1905	23,500,000
1899	37,560,000	1906	36,130,000
1900	47,960,000	1907	25,000,000
1901	26,970,000		



# FROST PREVENTION—THE ELECTRIC FROST ALARM

BY J. P. BOLTON

**W**ITH the possible exception of the loss occasioned by insect pests, there is probably no one cause of loss so seriously affecting fruit crops as frost. Various means of preventing frost damage to citrus and deciduous fruits have been tried throughout the fruit districts of California for many years. Fruit can only be saved by anticipating the approach of frost; restoration is impracticable. Just one April frost can destroy a large crop.

The necessity for a simple but effective method of forestalling frost was met

The method is simple and the expense sinks into insignificance by comparison with the results obtained. In one instance it is asserted that a company saved \$20,000 in a single season by the use of these devices, and there are many similar instances recorded, though of less magnitude. The plan of action is briefly as follows:

The Electric Alarm Thermometer is mounted within a shelter and set up in the orchard or vineyard to be protected, and connected by wire with the sleep-

the first place, to prevent a further fall of temperature by heating the lower stratum of air, and second, to keep the air near the surface in motion, thereby preventing the cold particles from settling to the bottom and causing condensation or frost formation. Even where frost has formed the process has been known to convert the frost into dew in less than thirty minutes.

This important problem of preventing frost damage is receiving the attention of fruit men everywhere. Some sections are more favored than others by reason



PATENT ORCHARD HEATERS OF THE FROST PREVENTION COMPANY, FRESNO, CALIFORNIA, PROTECTING FRUIT FROM FROST DAMAGE

by the Frost Prevention Company some years ago, when they purchased the Froude patent device for heating orchards and the electrical temperature alarm invented by J. P. Bolton. These devices have been used in the various fruit districts of California during the past few years with satisfactory results.

ing apartment of the owner, superintendent or foreman having charge of the work. The heaters are distributed through the orchard or vineyard to the number of forty to sixty to the acre and filled with crude oil. Torches for lighting the heaters are now placed in readiness. This completes the equipment.

Whenever the temperature approaches the freezing point, the electric circuit of the alarm thermometer closes and rings the distant bell automatically and persistently, thus announcing the approach of danger and enabling the fruit grower to gather his forces and fire up. The object of these numerous fires is two-fold. In

of the cheapness and availability of fuel oil. It is estimated that the average cost of protection under this method need not exceed \$3.50 an acre for a five-year period, with the current prices of crude oil. By observing a few simple precepts frost damage can be averted beyond question.

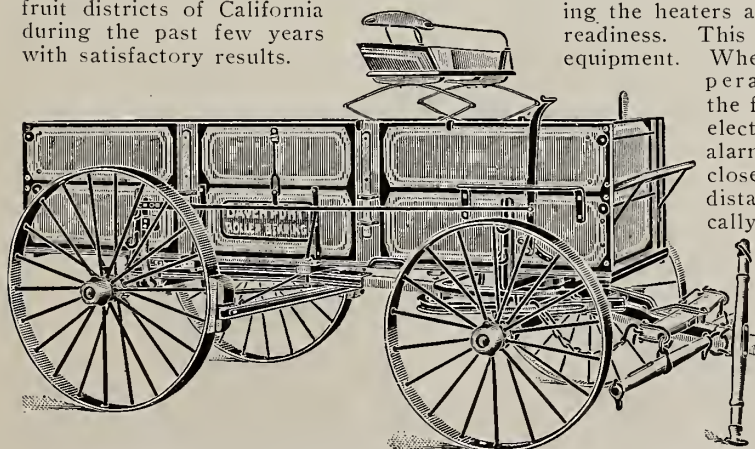
Whatever is worth doing is worth doing well.

Employees cannot, in all cases, be depended upon to look after the details and carry on the work. Your personal attention is needed.

Every detail should be prepared beforehand. There is no time to hunt up torches, tools, etc., after the danger point is reached.

Be prepared with a few more pots than you will be likely to need under average cold periods. The unexpected happens sometimes. Better too much protection than too little.

Accumulative or general firing is better than individual or single-handed



NEW BALL-BEARING WAGON, EASY RUNNING, FOR FARMERS AND FRUIT GROWERS



efforts, thus reducing the costs and increasing the results.

No fruit grower should depend on his neighbor for heat.

Clean culture under wet surface will assist in frost fighting in times of danger.

In places where there is a prevailing movement of cold air from a certain direction, increase the number of heaters on the side of the orchard from which the cold draft comes.

An efficient frost fighting corps is as essential as an efficient fire department.

The process of combustion of crude oil in orchard heating has a cleansing and beneficial effect on the orchard and

successfully carried on lately by a number of orchardists, smudging was something intangible, unproven and hypothetical.

Today it is one of the most certain things as a means of protection against the ravages of frost that has been discovered, says the Grand Junction, Colorado, Sentinel.

The congregation of farmers and orchardists that assembled in this city last Saturday, shows that the successful battling with the frost king is the most momentous question to which they are addressing themselves.

Hereafter the orchardist will not fool himself with that fiction that there can

CAPITAL \$50,000

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ASSETS OVER \$325,000

*Savings Bank in connection*



THE WAY MR. J. L. HAMILTON OF GRAND JUNCTION, COLORADO, PROTECTS HIS ORCHARD FROM FROST DAMAGE, BY USING THE PATENT ORCHARD HEATING DEVICE OF THE FROST PREVENTION COMPANY OF FRESNO, CALIFORNIA

increases the permanency and productiveness of trees.

The patented orchard heating devices and electric automatic frost-announcing thermometers are kept on exhibition at the Fresno, California, Chamber of Commerce, for fruit growers' investigation.

The following is taken from a publication of the United States Weather Bureau and should be preserved for reference:

### Injurious Temperatures

Table of temperature at which the following fruits are liable to receive injury from frost, compiled from information received from horticulturists, orchardists and gardeners throughout the entire Pacific Coast:

Fruits	In Bud	In Blossom	Setting Fruit	Other Times
Grapes, tangerines	31	31	31	28
Grape fruit, oranges, lemons, English walnuts	30	31	31	28
Plums, prunes	30	31	31	29
Almonds	28	30	30	28
Peaches	29	30	30	29
Apples	29	30	30	26
Pears	28	29	29	28
Strawberries	28	28	28	30
Tomatoes, sweet potatoes	31	31	31	31
Irish potatoes	30	30	30	31

### Smudging the Safeguard

In the minds of a great majority of people, previous to the experiments so

be no frost in the Grand Valley; that it is immune against any killing frosts and that this section alone is one of the favored spots in the world where nothing of harm may come to their crops because of Divine interposition, etc., etc.

Grand Valley can have frosts the same as all other sections of the country can have them, at a most inopportune time. It will be confessed that we have less to fear from them than most any section of the country, and that during many seasons the frost danger is infinitesimal. But to guard against the possibility of danger is what our people must do, and the only way to do it is by smudging intelligently and securing for use the best known means of warding danger away.

We believe that the people, not a part of them, but all of them, are thoroughly aroused to the necessity of putting themselves in a state of preparedness another year. The initial step was taken Saturday at the mass meeting in the Park Opera House, to ascertain from those who have made of it a study, the very best means of fighting the frost king and the manner in which to go about it to secure those means.

## Pearson's Cement Coated Nails

Are the best for fruit boxes. They are imitated because we advertise them and our product has an established reputation. The imitator has *no reputation* to sustain. *We have.* You never see an advertisement of the imitations. They are *always offered on our reputation.* It stands to reason that our nails are the best, otherwise we could not afford to advertise them. When you ask for PEARSON'S nails see that you get them. *Don't be imposed upon.*

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*Of Every Description*

Tarred Rope, Pruning Shears,  
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**Office Supplies  
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Ledgers, Journals, Time Books  
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If you have money to loan we will find you good Real Estate security or if you want to borrow we can place your application in good hands and we make no charge for this service

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HOOD RIVER, OREGON

We own and occupy the finest equipped and most modern bank in Hood River County

A General Banking and Trust Business Transacted  
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Make Our Bank Your Headquarters When in Hood River

Correspondence Invited

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W. H. Dunkley, Cashier

R. S. Howard, Jr., Assistant Cashier  
J. W. Ladd, Assistant Cashier  
Walter M. Cook, Assistant Cashier

INTEREST PAID ON TIME DEPOSITS AND SAVINGS ACCOUNTS

Accounts of banks, firms, corporations and individuals solicited. Travelers' checks for sale and drafts issued available in all countries of Europe.

They were met together "with one accord in one place" for the purpose of hearing an exposition of the frost prevention methods of California and to discuss the various systems which might be suggested.

Judging from the various talks made before that body of men, it was the consensus of opinion that a frost prevention outfit was just as necessary a part of an orchard's equipment as the spraying machines and pruning tools.

To take steps for the prevention of damage by frost is just as logical and reasonable as to take out a fire insurance policy or to take precautions against any other catastrophe or damage.

The growers of the Grand Valley should have learned by this time that a mere matter of smoke is comparatively useless when attempted against a freeze. It may prevent frost but as against a freeze it is absolutely impracticable.

There is but one way of combating a freeze and that is by heat sufficient to keep the temperature from reaching its closest limit when fruit is liable to be ruined by the variation of the fraction of a degree.

The fruitgrowers of California have known of the best way to prevent fruit damage for several years, and they have proven that their way is the safest. It is now up to the fruit growers of the Grand Valley to admit that they have not learned all there is to be known about fruit growing and by taking council of their Pacific Coast neighbors accept of their methods and by prompt action save any further damage in the future.

### Our More Than Debt of Gratitude

While it was an act of self-preservation which led Messrs. Hamilton, Haines, Matlack and several others to spend comparatively large sums of money for the purchase of oil to save their fruit crop, the net results have benefited this valley beyond the possibility of computation.

Had it not been demonstrated by these gentlemen that the fruit crops of this valley could be saved from frosts and freezes, land would have depreciated in this valley from twenty to thirty per cent, and we believe that we know whereof we are speaking when we make that assertion.

On the other hand, the demonstration which was made by Messrs. Hamilton and Haines has made the lands of the valley appreciate. We know almost to a certainty that next year we can be so prepared beforehand with crude oil and oil pots, that we may not have the annual recurring fear that we must lose some portion of our crop, whether it be great or small.

We therefore owe to Messrs. Hamilton, Haines and Matlack and perhaps one or two others, a debt of gratitude; in fact we owe to them a return of at least the difference between what the cost of crude oil would be and the refined product which they were compelled to purchase and for which they paid practically the retail price.

We do not know what the feelings of the gentlemen may be on this matter, but we understand that Mr. Haines spent somewhat over a thousand dollars on the experiment as did Mr. Hamilton.



## THE PROPER GRAFTING OF THE CHERRY TREE

BY E. C. ARMSTRONG, FRUIT INSPECTOR FOR MARION COUNTY, OREGON

**P**LANTING the Seedling.—Many persons are planting the seedling tree with the idea of top-grafting so that the body and the main forks will be in the Mazzard seedling. This I recommend.

**Tops Not More than Twenty Inches High.**—When the tree is planted the top should be cut off at a height of not more than twenty inches from the ground. This will form a head, and four or five limbs should be allowed to grow the first year. The following spring three of the best of these limbs should be chosen as the ones on which to graft the variety selected.

**The Tongue Graft.**—There are several methods of grafting, but the one which I would recommend for the grafting of the young trees is known as the tongue graft. This is made by cutting the stock to be grafted at an angle of forty-five degrees, making a slit lengthwise of the limb and parallel to the sides in this cut. The scion is treated in the same manner and the "tongue" of each of the parts is then slipped into the slit in the other, and a successful graft is assured if proper precautions are observed in the waxing.

**The Wedge Graft.**—Another method is known as the wedge graft, and is one that I would recommend for the larger limbs. This is well known to most of the horticulturists of the valley and needs but little description by me. This is performed by cutting the limb square off at the end and then making it smooth

with the knife. A cut slit is next made through the bark into the wood, parallel with the limb and following the circular shape of the limb. Never make a cut straight into the tree, toward the center, as this is more difficult to heal over. The scion is next cut to a point and in a wedge shape and is inserted into the cut in the limb in such a manner that the thick part of the wedge is outermost.

**The Method of Waxing.**—The place where the graft is made is waxed for the purpose of excluding the air and moisture and preventing the evaporation of moisture from the scion. The wax is made by taking six parts of resin, one of beeswax and one of tallow. Melt these together and apply to the entire graft with a brush while the wax is yet warm. Be very careful to see that all wounds in the tree are thoroughly covered.

**Cultivation.**—Some persons have the idea that cultivation of the cherry tree is not necessary. This is an error. The trees should be given a thorough, early cultivation, which should cease in time to allow the wood to ripen before the winter season sets in.

**Grafting the Old Trees.**—There are many old trees in this valley that are practically worthless as they now stand, which, by proper top grafting, can be brought into bearing and made profitable. I would recommend the Royal Ann or Lambert varieties of cherry, for they are better than others.

## A SUCCESSFUL WAY OF GRAFTING GRAPEVINES.

BY A. H. CARSON, OF REDLAND VINEYARD, GRANTS PASS, OREGON

**A**S there are many old vineyards in the country that are not commercial varieties, which the owners desire to change to those that are commercial, I would say that this change can be easily made by grafting.

To grub out the old vines and plant new takes five or six years before the vines would become profitable, while grafting the old stumps to desired varieties the second year after grafting the grafted vines will bear a heavy crop.

Scions for grafting should be cut about February 1st. For making the scions take the best matured canes of the previous year's growth and put away in a cool, dry place, packed in moss, to keep dormant.

You can begin grafting the first of March, and if your scions are properly kept, i. e., dormant, you can graft until April 15th.

The scion for grafting should contain three buds if short-jointed, two buds if long.

In shaping the scion to be set in the stock, it is cut as we would cut an apple or pear scion; with a sharp knife cut your wedge well up past the lower bud, leaving the scion thicker on the bud side, so that the pressure of the stock when the scion is placed, will contact with the inner bark of the scion. The scion should be well shoved down in the cleft in the stock, so that the bud will be at least half an inch down from the top of the cut-off stock, setting the scion at a slight angle to the bark of the stock, and then contact of inner

bark of scion and stock will be sure. The old vine to be grafted must be cut off six inches below the surface of the ground. If stock is very large a thin sharp chisel with a broad blade is used to split the stock to admit the scion. The splitting of the stock need not be at the center, but one side where the grain of the wood runs straight. After scion is placed, use binding twine to tie round the stock, to press firmly stock to scion. Use no grafting wax, but bring the fine earth in over the stock and around the scion, firming it carefully. If scion after being placed should extend above the surface, mound up with fine earth so as to cover the scion about an inch. The grafting of the grape is a simple operation, and if my suggestions are followed success is sure.

## SIZES OF FRUIT BOXES

### CHERRY BOX

Ends—23½x9x3½ thick.  
Sides—23½x19¾x3½ thick.  
Top and bottom—9x19¾x¾ thick.

### STANDARD APPLE BOX

Ends—10½x11½x7½ thick.  
Sides—10½x19¾x3½ thick.  
Top and bottom—5½x19¾x3½ thick.

### SPECIAL APPLE BOX

Ends—10x11x21x¾ thick.  
Sides—10x21¾x3½ thick.  
Top and bottom—5x21¾x3½ thick.

### PEAR BOX

Ends—8½x11½x¾ thick.  
Sides—8½x19¾x3½ thick.  
Top and bottom—5½x19¾.

### PRUNE BOX

Ends—4½x16x¾ thick.  
Sides—4x17½x3½ thick.  
Top—8x17½.  
Bottom—5½x17½.

# PIANO BUYING

The buying of a piano is an important transaction. There are many different makes of pianos, and there are many dealers. *Sherman, Clay & Co.* are an old, well known, established house, and carry the finest line of high-grade, dependable pianos to be found in any house on the Coast.

*They sell new pianos as low as \$265, \$275, \$290, \$300 and up to the incomparable Steinway at \$575 and up. Used pianos from \$150 to \$225*



The following list is remarkable and you will recognize the names — names as familiar as the names of old friends — Steinway, A. B. Chase, Everett, Conover, Packard, Kingsbury, Ludwig, Estey, Emerson, Kurtzmann, Wellington, A. B. Chase Player Piano; Kingsbury, Carola and Euphonia Inner Players

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Greater productiveness of trees—larger, cleaner, and finer fruit—more money. Isn't that fruit growers' reasoning? Nothing will contribute to this end more than effective spraying. And Effective Spraying can best be attained with

## Bean Magic Spray Pumps

Effective spraying means High Pressure Spraying and till the advent of the Bean Magics a high pressure could not be maintained with a hand pump for any length of time, on account of the body-racking effort needed to operate it. The Bean patent spring divides the work between the two strokes of the handle and works against only one-half the pressure shown on the gauge and saves exactly one-third the labor.

Our illustrated catalog No. 21 describes ten sizes of hand pumps, and contains much valuable spray information, and formulas. Catalog No. 22 describes Power Sprayers. Both books sent free. Write for our special offer; state number of acres and kind of fruit.

**BEAN SPRAY PUMP CO.**  
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San Jose, Cal.

## KIMBALL CULTIVATOR

PRICE \$16 F. O. B.

Is the one to use in all feet wide, very easy to which prevents striking No hoeing of trees where used on it in orchard, fern, pink, sorrel, oats, thistle it has no equal.



In using this implement the driver will stand in center of board, over knives, and to guide it will step to right or left, as occasion requires, and if anything should catch or gather on the knives the driver will step forward on draft board, tilt the handle forward, raising the knives, so that anything that had gathered on them may free itself. Keep all of the burs tightened and should any of the knives get bent out of shape force them back to place without removing them from the frame. Manufactured by

**S. P. KIMBALL, Salem, Oregon**

## GRANGER ASSOCIATION PROTEST AGAINST BILL

**W**HEREAS, a bill is now pending in the United States Congress, known as the Porter bill, applying to closed packages of apples as articles of state and interstate commerce, and

Whereas, the provisions of Section 3 of said bill establishing the standard size for apple boxes, and of Section 4, fixing grades, vitally affect the interests of the commercial fruit growers of the Pacific Coast, in particular;

Resolved, that the Yakima Valley Fruit and Produce Growers Association, of Granger, Washington, growers, packers and shippers of apples to the markets of the world, hereby records its objections to certain provisions of said bill, as follows, to-wit:

The measure of the "heaped bushel," upon which it is proposed that sizes of boxes and baskets shall be based, is a variable standard, dependent upon individual traits of character, sizes of apples or other conditions, and therefore not a scientific standard measure of capacity. Its only support is local custom in comparatively limited retail markets, where unpacked apples are sometimes sold in bulk. This provincial custom, where prevalent, also applies to other agricultural products. It belongs to the days of "rule of thumb" measurement and is unworthy of perpetuation by law as to apples or any other product.

The bill does not specify that the "heaped bushel" measure shall apply to apples packed in barrels, and in this respect is unjustly discriminatory.

The proposed standard of 2,564 cubic inches for a bushel of apples is an arbitrary and uncalled-for innovation. The Winchester bushel, containing 2,150.4 cubic inches is the United States standard. There is no more reason or justice in changing this standard as applied to apples than there would be in changing it for any or every other agricultural product.

The standard apple boxes used by this Association, and generally on the Pacific Coast, are of the following dimensions: 10½ inches deep by 11½ inches wide by 18 inches long, inside measurement, and contain 2,173.5 cubic inches, or more than a Winchester bushel.

This standard was adopted in the year 1902 by the Northwest Fruit Growers' Association, comprising the states of Washington, Oregon, Idaho, Montana, Utah and the province of British Columbia. It is the result of knowledge and practical experience, gained in the growing and marketing of fruits extending over many years. It is serving its purpose to the satisfaction of our growers, packers and buyers to the extent of millions of boxes each year.

Under the rules of this Association, and those under which most of the apples of the Pacific Northwest are marketed, each box is required to show the number of tiers and total number of apples therein, the variety and grade. The consumer, therefore, knows exactly what he is getting for his money. He does not get and is not entitled to a "heaped bushel," but he does get an honest bushel, whether or not he ever thinks of that standard of measurement in buying a box of Yakima apples.

The proposed grade "No. 1" discriminates as to size against certain popular

varieties of winter apples, such as Wine-sap, Missouri Pippin, Jonathan and Spitzenberg. In other respects the proposed grades are much inferior to the present grades of the leading shippers of the Northwest. For instance, our "No. 1" or "Extra Fancy" grade, instead of "90 per cent free" as proposed, must be absolutely "free from scab, worm holes, bruises and other defects, and properly packed."

The bill therefore discriminates against the growers of perfect fruit, first by barring out certain varieties on account of their smaller size, and second, by admitting a flood of inferior packs to the same classification.

Resolved, That we look with suspicion on this bill, discriminating as it does against apples packed in boxes and originating from a state where the local product of apples is uniformly marketed in barrels.

Resolved, That copies of these resolutions be sent to John W. Neumann, chairman of the Legislative Committee of the National Apple Shippers, to each member of our Congressional delegation and to the public press.

## GENERAL APPLE NOTES OF THE UNITED STATES

The following is the percentage census of apple trees in the different states, taking the United States as a whole at 100 per cent:

Maine .....	2.1	Missouri .....	9.9
New Hampshire ..	1.0	North Dakota .....	1.1
Vermont .....	.8	South Dakota .....	.1
Massachusetts ..	.9	Nebraska .....	1.9
Rhode Island .....	.1	Kansas .....	5.9
Connecticut .....	.6	Kentucky .....	4.3
New York .....	7.5	Tennessee .....	3.8
New Jersey .....	.9	Alabama .....	1.0
Pennsylvania .....	5.8	Mississippi .....	.3
Delaware .....	.3	Louisiana .....	.1
Maryland .....	.9	Texas .....	.7
Virginia .....	4.1	Oklahoma .....	1.4
West Virginia .....	2.7	Arkansas .....	3.7
North Carolina .....	3.2	Montana .....	.3
South Carolina .....	.3	Wyoming .....	1.0
Georgia .....	1.2	Colorado .....	1.0
Florida .....	1.0	New Mexico .....	.2
Ohio .....	6.4	Arizona .....	.4
Indiana .....	4.3	Utah .....	.4
Illinois .....	6.7	Nevada .....	.5
Michigan .....	5.4	Idaho .....	.5
Wisconsin .....	1.3	Washington .....	1.4
Minnesota .....	.4	Oregon .....	1.4
Iowa .....	3.4	California .....	1.4
United States .....	100.0		

### SUMMARY BY DIVISIONS

North Atlantic .....	20.0
South Atlantic .....	12.4
North Central, east of Mississippi River .....	24.1
North Central, west of Mississippi River .....	21.6
South Central .....	15.3
Far Western .....	6.6

### CONDITION OF APPLE CROP SEPTEMBER, 1908, AND COMPARISON

This report is issued by the Government Crop Reporter, by authority of the Secretary of Agriculture.

States—	Aug. 1 1908	Sept. 1 1908	Sept. 1 1907	Average Prev. 10 Years
Maine .....	55	45	70	63
New York .....	68	64	55	55
Pennsylvania .....	63	66	47	61
Virginia .....	60	65	37	51
West Virginia .....	55	58	30	46
North Carolina .....	77	79	25	58
Ohio .....	49	47	22	45
Indiana .....	30	29	27	48
Illinois .....	31	25	20	46
Michigan .....	54	50	40	58
Iowa .....	40	45	38	57
Missouri .....	30	33	9	45
Kansas .....	54	60	2	48
Kentucky .....	39	40	28	49
Tennessee .....	60	60	20	50
Arkansas .....	41	40	55	57
Colorado .....	37	50	15	71
Washington .....	83	82	88	81
Oregon .....	81	80	70	76
California .....	90	87	75	81



# FLOW OF WATER IN PIPE AT DIFFERENT ANGLES

FROM FARM AND HOME

A QUESTION often asked of the irrigation department of the Colorado Agricultural College, by the farmers of the State, is: "How much water will a certain sized pipe carry under a certain head, say ten feet, and what number of pipe would you recommend to stand the pressure of say 25 pounds per square inch?" A short discussion of this may be of interest to many farmers, so let me say that the quantity of water which a given pipe will carry depends upon many things; it depends upon the length of the pipe, the number and nature of bends in the pipe, the number and kind of valves in the pipe, etc. It is a very difficult if not an impossible thing to derive a formula which will give results for every case, for the conditions affecting the flow are so many and so varied. However, we can approximate and come close enough for all practical purposes. The simplest rule I know of is this: A pipe 1 foot in diameter laid on a slope of 1 to 1000 will flow approximately 1 cubic foot per second. The quantity flowing varies as the 5-2 power of the diameter; the quantity also varies as the square root of the grade or slope. For an example: How much water will a pipe carry which is 15 inches in diameter, on a grade of 3 to 1000? Fifteen inches is equal to 15-12 or 5-4 of a foot. If a pipe 1 foot in diameter on a grade of 1 foot in 1000 flows 1 cubic foot per second, and the quantity varies as the 5-2 power of the diameter; therefore the quantity from a 15-inch pipe on a grade of 1 foot in 1000 would be equal to 5-4 raised to the 5-2 power. The 5-2 power of any quantity means to take that quantity and raise it to the fifth power, then extract the square root. Hence taking 5-4 and multiplying it by itself five times (raising it to the fifth power), will give us a fraction whose numerator is 3125, and the denominator is 1024. Extracting the square root of this fraction we get approximately 1.75 second feet. Now remember the quantity varies also as the square root of the slope. In this problem the slope is not 1 in 1000, but 3 in 1000, therefore the quantity will equal the square root of 3, multiplied by this 1.75, which we obtained above, and the result will be 3.03 second feet, which is close enough to answer any ordinary purpose.

A more exact way of getting at practically the same problem is this: Take 2-100, multiply it by the length of the pipe, divide this by the diameter in feet or parts of a foot, then add 1.5. Divide the head under which the water flows, expressed in feet, by this result; extract the square root of the quotient. Now take the result you have, multiply it by the square of the diameter, expressed in feet, or parts of a foot, and then multiply the result by 6.3, and you will have the quantity flowing in cubic feet per second. Remember the dimensions of the pipe must all be in feet, not inches.

For example: Suppose we have a pipe 6 inches in diameter, 100 feet long, under a head of 22 feet; find the quantity of water flowing. Following the above rule, we would have 100 feet multiplied by .02 equals 2 feet. Now, 6 inches equals .5 of a foot, and 2 divided by .5 equals 4. Adding 1.5 gives 5.5. The

head, 22 feet, divided by 5.5 gives 4 for the result. Extracting the square root of this gives 2. Now take the diameter of .5 of a foot and square it; this gives .25. Multiply the above result by this .25 and we have .5. Then multiply this result, .5, by 6.3, and we have the result 3.15, which is the quantity flowing in cubic feet per second.

Another question often propounded is this: What is the proper thickness of a pipe to stand the pressure due to a certain head, say 50 feet? To get the pressure due to a certain head is always an easy matter. Take the head and multiply it by .434, and we have the pressure in pounds per square inch. One can easily remember this fraction by remembering that 1 cubic foot of water weighs 62½ pounds. There are 144 square inches in 1 square foot, so there would be 144 columns of water 1 foot high and 1 square inch in cross section. The weight of one of these columns can be found by dividing 62½ pounds by 144, which equals .434 pounds; hence the weight of a column of water 1

square inch in section and 50 feet high will be 50 times .434, which equals 21.7 pounds, which, of course, is the pressure per square inch in the pipe.

In order to get the thickness of the pipe necessary to withstand a certain pressure, follow this rule: Take the pressure in pounds per square inch, calculated from the head if necessary, multiply it by the diameter of the pipe in inches and divide this result by twice the strength of the material of which the pipe is made. Better use for this strength about 3500 for steel, 2500 for wrought iron, and 2000 for cast iron. This will give a good factor of safety. As an example: How thick should a steel pipe 18 inches in diameter be to withstand a head of 100 feet?

A 100-foot head will cause a pressure of 100 times .434, or 43.4 pounds.

The diameter, 18 inches.

.434 times 18 equals 881.2.

Then divide by twice the strength (2 times 3500 equals 7000), and we have 881.2, divided by 7000 equals .112 inches, the thickness.

## CALIFORNIA ENFORCING FOOD AND DRUG LAW

THE latest issue of the California State Board of Health Bulletin contains the following warning to fruit growers, packers, shippers and dealers:

Examples of mislabeling and misbranding of fruit have been brought to the notice of the State Laboratory. For instance, a box is labeled "Extra Fancy Black Tartarian Cherries." The contents of a box so labeled should consist entirely of Black Tartarian cherries, so far as possible; but a box so labeled and containing but one layer of Black Tartarian cherries, the rest of the contents consisting of extremely small red cherries, is in direct violation of the California Pure Food and Drug Law, particularly of Section 6, Subdivision 2, which reads:

"Food and liquor shall be deemed mislabeled or misbranded within the meaning of this act in any of the following cases:

"If it is labeled or branded or colored so as to deceive or mislead, or tend to deceive or mislead the purchaser, or if it be falsely labeled in any respect, or if it purport to be a foreign product when not so, or if the contents of the package as originally put up shall have been removed in whole or in part and other contents shall have been placed in such package."

The above statements with reference to cherries are used merely as an illustration; the principle involved applies to all fruits. In other words, the package must be honestly labeled. This warning is published for the guidance of those interested, because any violations in this respect will have to be dealt with according to the law.

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BETTER FRUIT, published at Hood River, is always on the lookout for commendable features of fruit growing localities.—The Dalles Chronicle.

## LETTER OF W. P. STARK ON THE YAKIMA VALLEY

I AM in receipt of a letter from W. P. Stark, of Louisiana, Missouri, who in company with James M. Irvine, the editor of The Fruit-Grower, visited Yakima County about the 1st of September. As throwing some light on the question of disposing of our fruits, I quote this letter in part here:

"Mr. Irvine and the writer returned the 10th (September), making our last stop in the Bitter Root country, another great valley. How are you getting along with the fruit crop in Washington? We undertook to buy some peaches and apples at Billings; they had a few very common California peaches and some cull Transparent apples. What a contrast to your magnificent Elbertas, etc.! At this very time the market price in North Yakima was low on peaches, and yet good markets, reasonably distant, unsupplied. Proper distribution is the secret of future success."

This condition revealed by this statement from Mr. Stark is very suggestive. No doubt it would have paid a few

growers very well to have kept an agent at Billings or some other point in that part of Montana, and to have sent him carloads to be distributed in the nearby towns. I am somewhat surprised that some of our enterprising buyers did not bountifully supply the Billings market. I think Mr. Stark expresses the truth very forcibly when he says that "proper distribution is the secret of future success." The buyer who will treat the growers fairly and not allow himself to be bound hand and foot by some organization, will hold a large trade and make reasonable profits.

While making this quotation from Mr. Stark, I think I may be pardoned in making further quotations from his letter. We drove along two sides of our experimental apple orchard while he and Mr. Irvine were on our fruit ranch. I make this mention that our readers may know what he means by "a great experimental work there." Mr. Stark alighted and secured at least one sample from this experimental orchard, where we are



testing eighty varieties of the apple—several of them from the Stark Brothers nurseries. I quote further:

"We appreciate what you said in comparing the Black Ben with Gano; Gano being more like Old Ben, etc., and when you have spare time we will be pleased to have you give us a letter along this line, also other points of interest concerning varieties that should be planted and not planted, for the benefit of others. You have certainly done a great experimental work there, and in our business we have gotten best results from individuals who do the work of this kind because they love it, rather than from the stations. Again thanking you for such a pleasant and profitable outing in your orchard, we remain, truly,

"William P. Stark."

It has always been a mystery to me how some fruit growers can maintain that the Black Ben and the Gano are one and the same apple. As we grow them here, no man, unless a very poor observer or blind with prejudice, would ever claim that they are identical. The Black Ben, as we raise it here, under our almost continued sunshine during the summer and autumn, takes on a much darker hue than the Gano. The latter differs from the old Ben Davis in being more uniformly red, but never so far as my observation goes, has the deep black of the Black Ben. The Black Ben sells better owing to its very fine appearance.

It is truly gratifying to have such a man as the President of the State Board of Horticulture of Missouri speak so well of my experiments in testing the different varieties of the apple. It was a matter of regret on our part that we could not have had Mr. Stark and Mr. Irvine spend a much longer time in our one-hundred-acre orchard. I know it would have been time well spent on my part.—The Ranch.

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as the best Spray for PACIFIC NORTHWEST Fruit Trees. It kills **San Jose Scale**, all Soft-Bodied Insects and Fungus. Write for Booklet No. 204 and for FREE SAMPLE  
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Sprays Fertilizers Horticultural Supplies

**Stanley-Smith  
Lumber Co.**

WHOLESALE AND RETAIL

**LUMBER**

Lath, Shingles, Wood, Etc.

**Hood River, Oregon**

## HORTICULTURIST PRAISES OREGON FRUITS

OREGON fruitgrowers do not realize the immense advantage they have over the fruitgrowers of the East," said W. P. Stark, president of the Missouri State Board of Horticulture recently. Mr. Stark was here with James M. Irvine, editor of the Western Fruitgrower, published at St. Joseph, in that state. Mr. Stark's headquarters are at Louisiana, Missouri. The two reached Portland after inspecting fruit conditions along the Union Pacific and Oregon Short Line, and they were simply astounded at the fruit they saw since crossing the Rocky Mountains.

"Your fruitgrowing climate is a revelation to me," Mr. Stark said. "While we in Missouri will have little fruit to speak of this season, Oregon growers will come to the front with a bumper crop that never fails them, apparently. We have been prevented from spraying by the wet spring, and when we don't spray the apple scab takes our apples. The late frosts in Missouri did the business for us this year, and so we won't be in the market at all this time."

"Your climate is such that you can spray at any time, and thus you are enabled to fight pests and fungus, although you have very little of these drawbacks to contend with. I saw no indications at all of the codling moth in Oregon, and I think you have that pest stamped out entirely."

"We were at Baker City and inspected fruit conditions there; then we came to The Dalles and took in the orchards in

that part of the state; later we visited Hood River, where the matchless apples grow that have captured the Eastern markets from us. We saw the fruit that later on will bring more a box in New York than Michigan fruit will bring by the barrel, because of the uniform quality and care in packing."

"We have large connections with the orchardists of Oregon and Washington, and propose to become interested more directly in the orchards out here. We go from here to Hood River again; after that take a trip through the Willamette Valley and to Southern Oregon. Then we will go north and take in the fruitgrowing section of White Salmon and points in Washington."

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AUSTIN JUSTUS has been building a grape drying room for Robert Schleicher on his vineyard, five miles east of Lewiston, and a cold storage plant, also erected by Mr. Justus, is nearing completion. Mr. Schleicher grows the finest varieties of European wine and table grapes, and his wine is celebrated throughout the Northwest, where it is in demand for table purposes. This vineyard contains 35 acres and the vines are loaded with the choicest of grapes, this year's crop being unusually large. Mr. Schleicher will make 1,500 gallons of wine this year. In the storage cellars on the vineyard he has 2,500 gallons of wine, which he is ageing. Some of it is five years old.

## PREPARE MODEL SCORE CARD FOR FRUIT TREES

IN the fall of 1907 the subject of score cards for fruit trees came before the attention of Professor John Craig and several members of the Lazy Club of Cornell University. By looking the field over to see what had been done in the matter of score cards for trees, and in particular nursery stock, it was readily apparent that nothing was tangible along these lines.

The Lazy Club, with its usual spirit and enthusiasm, appointed a committee to draw up a model score card for fruit trees, which would be simple, effective and aid in giving satisfactory information and protection to both the nurseryman and the purchaser. Although this card has had no official recognition, it has been approved by the horticulturists at Cornell University. The Lazy Club recognizes the fact that this card is only the beginning of the establishment of a

standard for quality of nursery stock. It is hoped this card will be used as a means of education to those interested in such subjects. The Lazy Club members invite suggestions and criticisms on this card.

### SCORE CARD FOR NURSERY STOCK

Kind.....	Variety.....
Stock received from.....	Date.....
Judged by.....	.....
1. Trueness to type.....	10
2. Size.....	15
Neither overgrown or stunted, and be of specified age and height.	
3. Root system.....	30
Well balanced, with an abundance of roots.	
4. Condition.....	25
Freedom from disease and pests. Moist condition of roots; of bark.	
5. Uniformity.....	20
As to the characters of the variety.	
Respectfully submitted,	
W. H. WICKS,	
M. B. CUMMINGS,	
L. D. BATCHELOR,	
W. J. SOWDER,	
O. S. MORGAN,	
Committee.	

## A GERMAN METHOD OF MAKING SWEET CIDER

OF the manufacture and sterilization of pure apple juice, Consul-General Peters, of Munich, says the process is most simple. The apples, as soon as picked, are forwarded to the factory, where they are washed absolutely clean. They are then torn into small particles and pressed. The juice is then placed in a large air-tight retort, where it is sterilized; it is then allowed to settle for some days and then filtered, so that the juice is absolutely transparent. The juice is then bottled, a slight amount of carbonic gas is added, and a space of about an inch left in the bottle to allow for expansion. The bottles are placed in a car, and this car with its load of bottles is pasteurized, the process taking about four hours, the water in the

retort being heated to from 150 to 158 degrees, absolutely destroying all the germ life that may exist. The pure apple juice thus treated contains perhaps ½ per cent of alcohol and is a most delicious drink, retaining all the flavor of the pure apple cider.

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Almost the whole world knows of Hood River as a place that produces the best fruits, and all of Hood River Valley should know, and could know, that there is one place in Hood River, under the firm name of R. B. Bragg & Co., that the people can depend on getting the most reliable dry goods, clothing, shoes and groceries at the most reasonable prices that are possible; try it.



# BETTER FRUIT

HOOD RIVER, OREGON

OFFICIAL ORGAN OF  
THE NORTHWEST FRUIT GROWERS' ASSOCIATION

A MONTHLY ILLUSTRATED MAGAZINE  
PUBLISHED IN THE INTEREST OF UP-TO-DATE  
FRUIT GROWING AND MARKETING

ALL COMMUNICATIONS SHOULD BE ADDRESSED AND  
REMITTANCES MADE PAYABLE TO

BETTER FRUIT PUBLISHING COMPANY

E. H. SHEPARD      CHRIS GREISEN  
EDITOR AND PUBLISHER      TRAVELING REPRESENTATIVE

SUBSCRIPTION PRICE \$1.00 PER YEAR  
IN ADVANCE IN UNITED STATES AND CANADA

FOREIGN SUBSCRIPTIONS, Including Postage, \$1.50  
ADVERTISING RATES ON APPLICATION

Entered as second-class matter December 27, 1906,  
at the post office at Hood River, Oregon,  
under act of Congress of March 3, 1879.

WHICH is better, to have one good, first-class fruit journal, or half a dozen ordinary horticultural papers?

Colonel Filcher stands pre-eminent as a publicity man in California. He had charge of the California building at the Lewis and Clark Exposition, and will have charge of the California building at the Alaska-Yukon Exposition in Seattle in 1909. The editor, when a boy, knew him, as he lived near his father's orchard. At that time he was teaching school. He was on terms of intimate friendship with the editor's father, consequently during the Lewis and Clark Fair we spent many hours together in his private office and his conversation was delightfully interesting and instructive. One remark of his burned itself into my memory and has been a guiding star ever since. In speaking of the Northwest he said, "Pull together," and followed it up with an explanation which more fully expressed his meaning. It was good advice, and it applies, therefore it seems fitting that an outline should be given here, that we all may profit by it.

"First," he said, "the United States should stand and pull together, to profit from foreign trade, for the purpose of up-building our Union and for the purpose of securing immigration of the right kind. The Pacific states should work in harmony for the up-building of the Pacific slope. The Northwest should be a unit for development and work together to bring Eastern settlers and capital to develop its unlimited resources."

The editor asked, "Why?" To which he replied: "Because you can do so much more together than as individual states and do it on a grander scale and in a way that will not only attract people, but commend them."

"Get them to the Northwest. They will settle somewhere. They will not all settle in the same place. Each state will get its share, so will each district. The main thing is to get Eastern people out here, then when you do, let each section show up its resources and advantages in the most attractive manner. Every district will get its share. To sum it up: Pull together to get Eastern people to the Northwest. When you do get them out here do your best in each locality to land them."

This has a special application to the existence of "Better Fruit," and the question naturally arises: Which is bet-

ter, to have a dozen ordinary fruit papers of a local nature, or one good fruit paper that is general? Before forming an opinion make an investigation of what is being done and the possibilities of what can be done.

"Better Fruit" is devoted exclusively to the fruit industry of the Northwest. It has been general as possible and has only been limited by insufficient financial support from all districts. It is on a sound basis now.

Now, as "Better Fruit" has the support and financial assistance of every district in Washington, Idaho and Oregon, it can do more in the future than in the past. "Better Fruit" now has a big and liberal support. Every district is doing something to help it along. "What does this mean?" "It means that 'Better Fruit' is now the handsomest and best fruit paper published in America." This edition is fifty-six pages. It is printed on book paper, better paper than is used by any other publication west of the Mississippi River. It has more magnificent illustrations in one month than all the other horticultural papers of the Northwest combined. The illustrations in "Better Fruit" in one month are more than any other horticultural paper shows up in a year. It is the only one running a handsome colored cover page of some scene referring to fruit. "Better Fruit" for months has been running forty-eight to fifty-six pages monthly.

"Better Fruit" is now in a position to publish an edition of from eight to ten thousand copies monthly. As much in a month as some local papers issue in a year. Where are the subscribers to a local paper? In your own locality, of course, and there only. What good will that do you in the East? Not any. How about "Better Fruit"? It has subscribers in every state and territory of the Union, every province in Canada and thirteen foreign countries. Twenty-five to fifty thousand copies go East annually. The average local horticultural paper will not issue much more than twelve hundred

monthly, and all of these will be circulated at home, which does your district no good in the outside world. All your local home boosting should be done by your local commercial papers, but support a general fruit paper with an extensive circulation if you want to get settlers in your district. If you have a good local fruit paper support it. If you want one start it; but don't expect it to bring people to you. It cannot do it and it will not. But don't fail to support "Better Fruit." Give it all the help you can. The more support "Better Fruit" gets the more it can do. Do not expect a local paper to do what "Better Fruit" has done, is doing, and can do.

If you do you will be disappointed, unless you can find a publisher who is willing to do what the editor and publisher of "Better Fruit" has done, that is, to put in two and one-half years of hard work without pay, and furthermore your publisher or yourselves must be willing to finance it. The amount of money put in "Better Fruit," with the amount of money earned and put back, now exceeds \$30,000. It costs not less than \$1,250 per month, or \$15,000 per year, to publish "Better Fruit." If our support is continued the good work will go on. If it is increased, "Better Fruit" can and will do more, but if districts think it good policy to start local papers and draw support from "Better Fruit" it will handicap us just in proportion to the amount of support withdrawn, but it won't kill us. No one district, no one state, not even the whole support of the Northwest, alone is sufficient to maintain "Better Fruit" with its present circulation in its present high class style typographically.

Each district in the Northwest must be the judge; each must decide for itself whether it wants a plain local fruit paper printed on ordinary paper, of twenty or twenty-four pages, with a few poor illustrations and plain cover, publishing four thousand copies per month, with no circulation outside of the district to speak

## COLD STORAGE FOR APPLES

Our storage rooms are clean and sweet. Our insurance rate the lowest in the city. Our location (the big, yellow brick building between steel bridge and Union Depot) is the most convenient. Season rate twenty-five cents per box. Special rate on large lots. Private track facilities

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Portland, Oregon



## Our Unparalleled Clubbing Offers

"Better Fruit" offers to readers what it considers the finest list of clubbing offers ever placed before the public in the Northwest. Its variety is one that must appeal to readers of all classes. Look it over carefully, select the one you want and send us the proper amount and we will do the rest.

Review of Reviews.....	\$3.00	World's Work .....	\$3.00
Success Magazine .....	1.00	Delineator .....	1.00
"Better Fruit" .....	1.00	"Better Fruit" .....	1.00
	\$5.00		\$5.00
All for .....	\$3.00	All for .....	\$3.00
Sunset Magazine .....	\$1.50	Country Life in America....	\$4.00
Road of a Thousand Wonders..	.75	McClure's and Woman's Home	
"Better Fruit" .....	1.00	Companion or Success .....	2.00
	\$3.25	"Better Fruit" .....	1.00
All for .....	\$1.50		\$7.00
Pacific Monthly .....	\$1.50	All for .....	\$4.75
Weekly Journal .....	1.00	Country Life in America....	\$4.00
"Better Fruit" .....	1.00	American and Success or	
	\$3.50	Woman's Home Companion	2.00
All for .....	\$2.00	"Better Fruit" .....	1.00
The Farmer (Spokane, Wash.)	\$0.50		\$7.00
"Better Fruit" .....	1.00	All for .....	\$4.75
Both .....	\$1.00	Country Life in America....	\$4.00
Breeders' Gazette .....	\$2.00	Review of Reviews or Outing..	2.50
"Better Fruit" .....	1.00	"Better Fruit" .....	1.00
Both .....	\$2.00		\$7.50
Northwest Poultry Journal....	\$0.50	All for .....	\$4.75
"Better Fruit" .....	1.00	Country Life in America....	\$4.00
Both .....	\$1.00	Everybody's Magazine .....	1.50
Weekly Oregonian .....	\$1.50	Delineator .....	1.00
"Better Fruit" .....	1.00	"Better Fruit" .....	1.00
Both .....	\$1.50		\$7.50
Oregon Agriculturist .....	.50	All for .....	\$4.75
"Better Fruit" .....	1.00	Country Life in America....	\$4.00
Both .....	\$1.00	"Better Fruit" .....	1.00
American Fruit and Nut			\$5.00
Journal .....	.50	Both for .....	\$4.00
"Better Fruit" .....	1.00	Everybody's Magazine .....	\$1.50
Both .....	\$1.00	Delineator .....	1.00
World's Work .....	\$3.00	"Better Fruit" .....	1.00
Everybody's Magazine .....	1.50		\$3.50
Delineator .....	1.00	All for .....	\$2.25
"Better Fruit" .....	1.00	World's Home Companion ..	\$1.00
	\$6.50	"Better Fruit" .....	1.00
All for .....	\$3.75		\$2.00
World's Work .....	\$3.00	Both for .....	\$1.40
Everybody's Magazine .....	1.50	Garden Magazine .....	\$1.00
"Better Fruit" .....	1.00	Farm Journal .....	.75
	\$5.50	"Better Fruit" .....	1.00
All for .....	\$3.00		\$2.75
World's Work .....	\$3.00	All for .....	\$1.75
"Better Fruit" .....	1.00	Garden Magazine .....	\$1.00
	\$4.00	"Better Fruit" .....	1.00
Both for .....	\$3.00		\$2.00
World's Work .....	\$3.00	Both for .....	\$1.40
Country Life in America....	4.00	Farm Journal .....	\$ .75
Everybody's Magazine .....	1.50	"Better Fruit" .....	1.00
Delineator .....	1.00		\$1.25
"Better Fruit" .....	1.00	Pacific Monthly .....	\$1.50
	\$10.50	"Better Fruit" .....	1.00
All for .....	\$6.50		\$2.50
		Both for .....	\$1.75

*These clubbing rates do not apply in Canada owing to extra postage*

of, filled with articles of more or less questionable value, or to continue to support "Better Fruit," which can publish 100,000 copies annually and send 50,000 East to bring people to the Northwest; a paper that on account of its extensive circulation, handsome appearance and valuable articles has done more to place the fruit industry of the Northwest pre-eminently before the public and to bring Eastern people to the Northwest than any other single publicity influence. ♦ ♦ ♦

WE are informed that Stark Bros. Nursery and Orchard Company, of Louisiana, Missouri, placed an order with the Hood River Apple Growers' Union for a carload of Delicious, Ben Davis, Aiken, Jonathan, Winter Banana and Staymen Winesap apples. The price for Delicious is \$2.50, for Ben Davis \$1 and Aiken \$1.50. We publish these prices for the reason that we believe they will be interesting to fruit growers, as they indicate what Easterners think of these varieties. In the Northwest, while most orchardists are crazy over Spitzenbergs and Newtowns, it is our belief that there are many other good varieties that growers would be justified in planting, and it is our belief that a man who has several varieties in his orchard will, average a better crop than the man who has only one or two varieties. We believe in pollenization, although there is not sufficient data to prove it. ♦ ♦ ♦

ON another page you will find the advertisement of the Hardie Manufacturing Company, who have opened a branch at 22 Front Street, Portland, Oregon. This company operates a large factory at Hudson, Michigan, where they have their own foundries and machine shops. There they have made high-class spraying machines exclusively for ten years. Their products are well and favorably known in the East, and they now hope to be able to give their Western trade the benefit of a location at Portland. One of their power sprayers was exhibited at our Fruit Show and excited much favorable comment. They extend an invitation to all fruit growers to call on them at Portland or write for their new catalogue.

### BARGAINS—FRUIT RANCHES

One hundred and twenty-two acres adjoining the townsite of Woodville, Oregon; good house and barn, house only twenty rods from the Southern Pacific station. Eighty-two acres of level, bottom land, forty acres of timbered hillside. This land lies along the bank of the Rogue River. The soil is gray or black loam. There is no better land in the entire valley for apples, pears, peaches or walnuts. The hillside would be suitable for grapes and the timber will more than pay for clearing. This ranch must be sold by December 15. Price, \$16,000 cash, or one-half cash and the balance in ninety days.

Also thirty-five acres seven miles southwest of Grants Pass, Oregon; thirty acres level bottom land along the Apple-gate River. Five acres is good hillside, suitable for grapes. The bottom is "river-wash" soil, clear and partially cultivated. One hundred inches of water belong with this land. Price, \$2,500.

Address, Rev. William C. Long, Grants Pass, Oregon.



## A LIST OF THE ADVERTISERS IN BETTER FRUIT

**A**DVERTISERS in "Better Fruit." When writing these firms please mention "Better Fruit."

**Fruit Dealers**

Levy & Spiegl, Portland, Oregon; W. B. Glafke & Co., Portland, Oregon; Davenport Brothers, Portland, Oregon; Pearson & Page, Portland, Oregon; Page & Son, Portland, Oregon; Mark Levy & Co., Portland, Oregon; Dryer, Bollam & Co., Portland, Oregon; Portland Brokerage Company, Portland, Oregon; Richcy & Gilbert, Toppenish, Washington; Ryan & Newton, Spokane, Washington; Lindsay & Co., Helena, Montana; Davidson Fruit Company, Hood River, Oregon; H. Wood & Co., Chicago, Illinois; Ryan & Newton, Butte, Montana; Newhall & Son, Chicago, Illinois; Gibson Fruit Company, Chicago, Illinois; D. Crossley & Son (England), New York; Steinhardt & Kelly, New York; Appel & Ujffy, New Orleans, Louisiana; A. Levy & J. Zentner, San Francisco, California; Wagner & Sons, Chicago; D. C. Evans & Co., Kansas City, Missouri.

**Nurseries**

H. S. Galligan, Hood River, Oregon; Vineland Nursery, Clarkston, Washington; The Sunnyside Nursery, Sunnyside, Washington; Albany Nursery, Albany, Oregon; Yakima Valley Nursery, North Yakima, Washington; F. W. Dixon, Holton, Kansas; Woodburn Nurseries, Woodburn, Oregon; The Dalles Nursery, The Dalles, Oregon; Chico Nursery Company, Chico, California; A. Holoday, Scappoose, Oregon; Hood River Nursery Company, Hood River, Oregon; Oregon Nursery Company, Salem, Oregon; C. F. Lansing, Salem, Oregon; C. B. Wood, Selah, Washington; Portland Wholesale Nursery Company, Portland, Oregon; H. A. Lewis, Montavilla, Oregon; A. C. E. Brown, Selah, Washington; Milton Nursery, Milton, Oregon; Tim Kelly's Nursery, North Yakima, Washington; R. Layritz, Victoria, British Columbia; Washington Nursery Company, Toppenish, Washington; O. F. Smith, Blackfoot, Washington; The Shenandoah Nurseries, Shenandoah, Iowa; Stark Bros. Nursery Company, Louisiana, Missouri; H. E. Angel, Wapato, Washington; Orchard Supply Company, Salt Lake City, Utah; Clinton Falls Nursery Company, Owatonna,

Minnesota; Mount Arbor Nursery, Shenandoah, Iowa.

**Real Estate**

White Salmon Land Company, White Salmon, Washington; J. W. Baker, Hood River, Oregon; Chapin & Herlow, Portland, Oregon; J. H. Heilbrunner & Co., Hood River, Oregon; George D. Culbertson & Co., Hood River, Oregon; F. W. Dehart, Underwood, Washington; H. R. Albee, Hood River, Oregon; Charles Meserve, Medford, Oregon; H. E. Waite, Mosier, Oregon; Burbank & Angus, Cashmere, Washington; The Hood River Land Emporium, Hood River, Oregon; George Chamberlain, Mosier, Oregon; Estes Realty & Investment Company, White Salmon, Washington; John H. Robinson, Grants Pass, Oregon; J. C. Hostetler, The Dalles, Oregon; C. R. Field, White Salmon, Washington; Grant & Dye, Seattle, Washington; The Churchill-Matthews Company, Portland, Oregon; C. E. Landy & Co., Kennewick, Washington; Hudson Land Company, The Dalles, Oregon; Gillette-Riggs Land Company, Portland, Oregon; Rev. William C. Long, Grants Pass, Oregon; Frank Davenport, Hood River, Oregon; Baker Irrigation Company, Baker City, Oregon; Charles Meserve, Medford, Oregon; Tennant & Miles, North Yakima, Washington; W. F. Cash, Underwood, Washington; R. Thomas, Grants Pass, Oregon.

**Commercial Clubs**

Klickitat Development League, Goldendale, Wash.; Hood River Commercial Club, Hood River, Oregon; Green River Commercial Club, Green River, Utah; Business Men's Association, The Dalles, Oregon; North Yakima Commercial Club, North Yakima, Washington; Corvallis Commercial Club, Corvallis, Oregon; Kennewick Commercial Club, Kennewick, Washington; Bingen Commercial Club, Bingen, Washington.

**Banks**

First National Bank, Hood River, Oregon; Butler Banking Company, Hood River, Oregon; Hood River Banking and Trust Company, Hood River, Oregon; Ladd & Tilton, Portland, Oregon.

**Cement Nails**

J. C. Pearson, San Francisco, California.

**Fruit Growers' Unions**

Yakima County Horticultural Union, North Yakima, Washington; Rockford Fruit Growers' Association, Rockford, Washington; Douglas County Fruit Growers' Association, Roseburg, Oregon; Hood River Fruit Growers' Union, Hood River, Oregon; Apple Growers' Union, Hood River, Oregon.

**Books and Periodicals**

Slocum's Book Store, Hood River, Oregon; Oregon Chamber of Commerce Bulletin, Portland, Oregon; The Produce Reporter, Chicago, Illinois.

**Cultivators**

J. P. Kimball, Salem, Oregon.

**Dry Goods**

The Paris Fair, Hood River, Oregon.

**Electrical Companies**

Hood River Electric Light and Power Company, Hood River, Oregon; Hood River Electric Light and Wire Company, Hood River, Oregon.

**Engraving**

Hicks-Chatten, Portland, Oregon.

**Furniture**

S. E. Bartmess, Hood River, Oregon.

**Flour and Feed**

Hood River Milling Company, Hood River, Oregon; Wasco Milling Company, The Dalles, Oregon; Transfer and Livery Company, Hood River, Oregon; McReynolds & Co., Hood River, Oregon.

**Gents' Furnishings**

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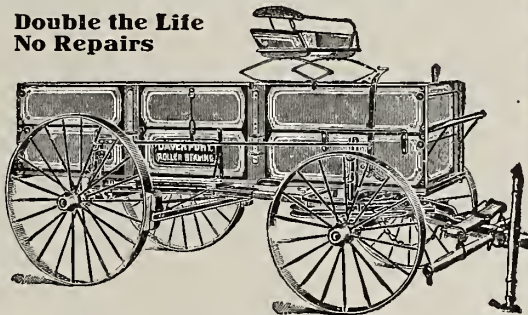
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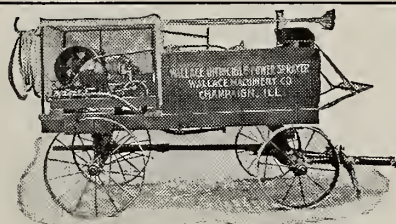
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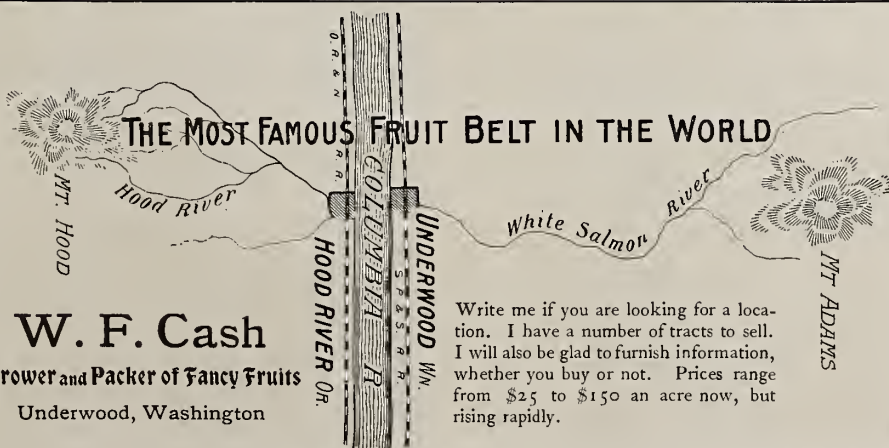
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Newtown &amp; Spitzenberg propagated from selected bearing trees. Make no mistake but start your orchard right. Plant generation trees. Hood River (Clark Seedling) strawberry plants in quantities to suit.

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It is conceded by leading Nurserymen throughout the United States that the

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Manufacture and have placed upon the market the two greatest **Labor and Money Saving Machines** for Nurserymen on the market, which have been perfected through actual tests on their own and the grounds of the largest Nurserymen in the States. **The Trencher** leaves a clean-cut open trench to receive the plants, grafts or cuttings. **The Soil Firmer** packs the soil firmly around the roots, thus insuring the growth of every worthy plant, graft or cutting. An illustrated Catalogue and further particulars regarding these labor and money savers mailed on request **Clinton Falls Nursery Company** Owatonna, Minn.



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Chicago and New York are the two greatest consumers of your products in America.

The two combined will consume more high quality fruit than all the rest of the United States together, and draw better prices on the best grades than any other markets.

Each town has its advantages.

New York has made record prices on a few cars and is a valuable market at times. Its worst fault is that it goes to extremes. You may at times (not always by any means) get more there for one or two cars of something fine when the article is scarce, than in Chicago.

We have known, and have made ourselves, some splendid sales there, but when it comes to the average for the season Chicago is invariably ahead, especially in a year of heavy supply. Fair minded New York people admit this, and it is too well understood among the heavier shippers of the West for argument.

The Fruit Auction System in Chicago, which was for years unsatisfactory, is now on a high plane and is fast gaining the confidence it deserves and doing an immense business.

As to the dealers themselves, there are a number of good ones in Chicago, but it is generally conceded, we believe, that if there is any one house at the top our house is that one.

We demand, and get, a fair rate of commissoin, and will accept nothing less, but we will give you value received for this commission.

We solicit the accounts of heavy shippers of fruit for either Chicago or New York sale. (You notice we put Chicago first.) Will sell at auction or otherwise, as you direct. We believe our responsibility is unquestioned.

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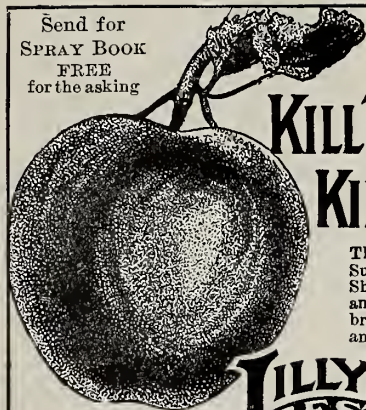
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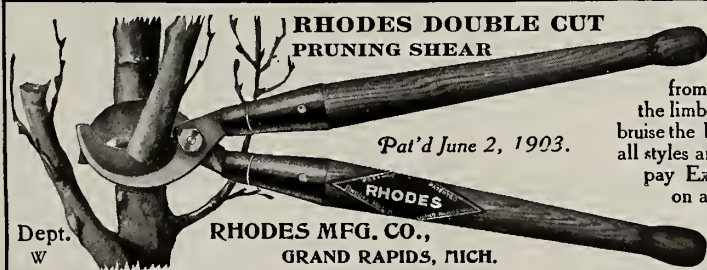


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made that cuts  
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*Good Quality  
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Low Prices*

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Electrical Supplies and Fixtures, Scientific Wiring of Buildings a Specialty. Underwriters' Rules apply to all work in Hood River and surrounding districts.

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Tile From 3 to 12 Inch

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Apple and pear grafts, piece and whole  
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Established 1870—600 Acres

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Our new plant can fill your orders promptly  
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Are prepared to furnish 3000 Horse Power, either  
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THE GOVERNMENT'S TIETON PROJECT will bring under irrigation in 1909-10 30,000 acres of the choicest apple, pear and peach land in the whole Yakima Valley, and that means in the Northwest. You can buy this land in ten-acre tracts from five to fifteen miles from the city of North Yakima, for from \$50 to \$150 an acre in easy monthly or annual payments; the government gives you ten years, without interest or maintenance fees, to pay for the water right, which will be exact cost. A rare opportunity to get into the fruit business with very little capital in a famous district.

*We sell fruit ranches, suburban acres on car lines and city property*

*Write for free illustrated booklet with full information*

**TENNANT & MILES, INC., Agents** NORTH YAKIMA  
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## COME TO KENNEWICK VALLEY

*Where early strawberries net the grower an average of \$3.25 per crate.*

*Where there is an abundance of water from a gravity flow ditch.*

*Where land improved and raw can be bought on easy terms.*

*Where the shipping facilities are second to none in the entire Northwest.*

*Where you can put your children in the best schools in the State.*

*Where everybody prides themselves on their pretty homes.*

*For a beautiful colored booklet telling all about the wonderful resources and possibilities of Kennewick Valley, write to*

W. F. KNAPP, Secretary of Kennewick Commercial Club Kennewick, Wash.



# APPLE LAND JUST PUT ON THE MARKET

Write to or call on Frank Davenport, Hood River, Oregon

If you want to buy good apple land in Hood River County, not over six miles from the City of Hood River, West. I have 1800 acres to sell cheap in lots and prices as follows:

160 Acres at \$35.00 per Acre

160 Acres at \$30.00 per Acre

160 Acres at \$25.00 per Acre

480 Acres at \$20.00 per Acre

320 Acres at \$15.00 per Acre

520 Acres at \$10.00 per Acre

This land has water on every 160 acres, and land joining this on the east can not be bought for less than \$225 per acre. Will not sell this land in lots of less than 160 acres.

*Terms:* Half cash, balance long time at six per cent





EASILY DETACHED  
ALWAYS READY FOR ANY  
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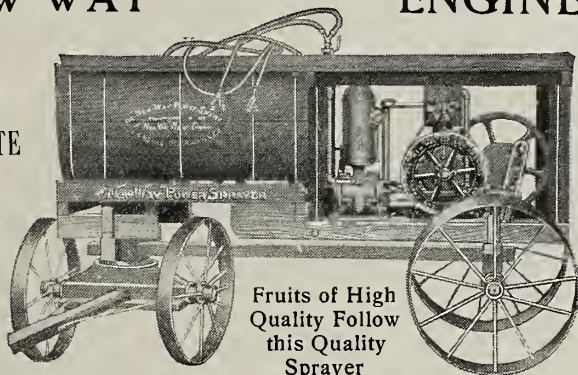


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"NEW WAY" AIR COOLED ENGINE

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Fruits of High  
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Carries high pressure without the usual vibration or strain, and is the most practical, durable and economical machine ever built for spraying. Use your own running gear if you prefer. Write us today for Spray Catalogue No. S-8



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LINES IN OREGON

are sending *tons* of Oregon literature to the east for distribution through every available agency. Will you not help the good work of building Oregon by sending us the names and addresses of your friends who are likely to be interested in this state? We will be glad to bear the expense of sending them complete information about Oregon and its resources.

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*The fare from a few principal cities is:*

Denver . . .	\$30.00	Louisville . .	\$41.70
Omaha . . .	30.00	Cincinnati . .	42.20
Kansas City	30.00	Cleveland . .	44.75
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If you want to bring a friend or relative to Oregon, deposit the proper amount with any of our agents. The ticket will then be furnished by telegraph.

WM. McMURRAY

General Passenger Agent

PORTLAND, OREGON





*Water will run up hill*

WHEN A

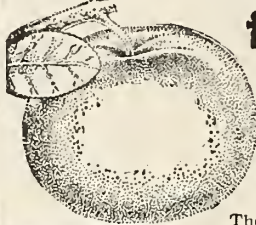
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Is placed at creek or spring. Most economical pumping device in existence. No cost of operation. No attendant required. Catalogs and estimates furnished free.

**COLUMBIA STEEL  
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OREGON

## MAKE A FORTUNE IN FRUIT

### \$2,000 to \$8,000 a Year Profit from Only 10 Acres



Home of Famous  
"McINTOSH RED"  
Apples.

You have heard of the wonders of irrigation. How would you like to own ten acres of irrigated fruit land in the famous Bitter Root Valley, where apples yield a clear profit of from \$2,000 to \$8,000 on ten acres every year? Where Grains and Vegetables also are produced in such abundance that the profits are almost beyond belief? Here's your chance, if you have a little ready money—say \$300 to \$500.

### The World's Greatest Irrigation Project

The Bitter Root Valley Canal—81 miles long—built at a cost of over \$1,500,000—is practically completed. It creates an opportunity for you to make a fortune in fruit. We are now offering for sale a portion of our 40,000-acre irrigated tract, at a mere fraction of its value as measured by that of adjoining land. We are making such easy terms that even the man of small means can afford to invest.

### A Few Hundred Dollars Hold 10 Acres of the Finest Fruit Land in this Wonderful Irrigated BITTER ROOT VALLEY of MONTANA

Land and water sold outright—no "homesteading." Present prices of only \$100 to \$150 per acre, on easy terms, afford those interested in fruit growing an unusual opportunity. This is the most attractive, prosperous and longest tried fruit valley in the Pacific Northwest. Nestled among the mountains, amid scenic beauties unsurpassed. Soil of exceeding depth and richness. The Land of Perfect Fruit! No insect fruit pests! 15,000 good neighbors! Rural Free Delivery—Farmers' Telephones—Fine Schools and Churches. Good roads everywhere. Steam and electric railroads bring world's best markets to your door. Delightful place to live. The buyer of each tract of land will become a proportionate owner in the Canal, and thus obtain perpetual water rights.

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Price  
is  
Right*

**CALIFORNIA SPRAY-CHEMICAL CO.**

BEAN SPRAY PUMP Co., San Jose, Sales Agent

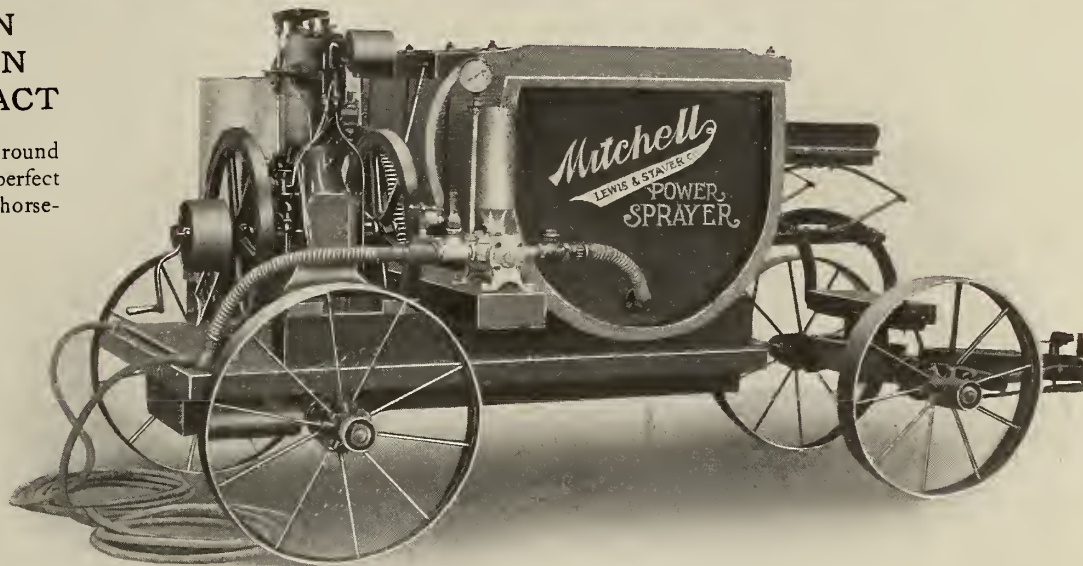
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# AT LAST—A SUCCESSFUL POWER SPRAY MACHINE

LOW DOWN  
SHORT TURN  
LIGHT, COMPACT

This outfit consists of a round bottom mixture tank, a perfect agitator, a simple two horse-power **STOVER** Gasoline Engine which is cooled by means of a circulating pump, low covered cooling tank, water can't possibly slop over and a figure No. 1233 Myers Spray Pump, mounted on a low down, goose neck, short turn, steel wheel truck. Fruit growers claim that this outfit has no equal.



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A FULL LINE OF ALL KINDS OF SPRAY APPARATUS

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A Shipper once told us, "I accumulated \$20,000 and went into the Fruit Business, and *shipped it all away*. He was good enough to add, "If there had been a Produce Reporter Company then (and I'd known enough to join it), I would not be on the ragged edge today."

There may be wisdom (perhaps prophecy) in this for you, Mr. Shipper, at least the importance of the subject warrants your spending enough time to write us, What, When, Where, How Much You Ship. We can then explain pointedly how it will make you, or save you money to become a member of the

## PRODUCE REPORTER COMPANY

We will refer you to a lot of your neighbors.

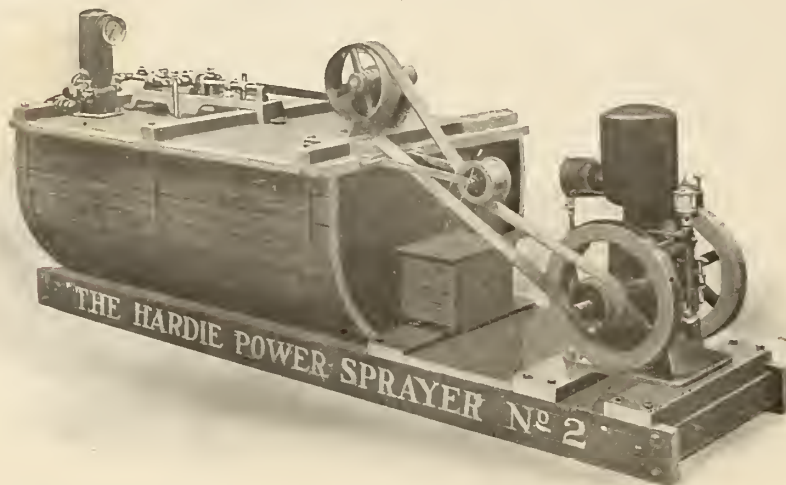
CHICAGO, ILLINOIS



# The "Hardie" Sprayers

PORTLAND, OREGON

*Nothing  
to  
Watch  
but the  
Spray*



*The  
Sprayers  
with the  
Trouble  
left out*

**WEIGHT 700 POUNDS**

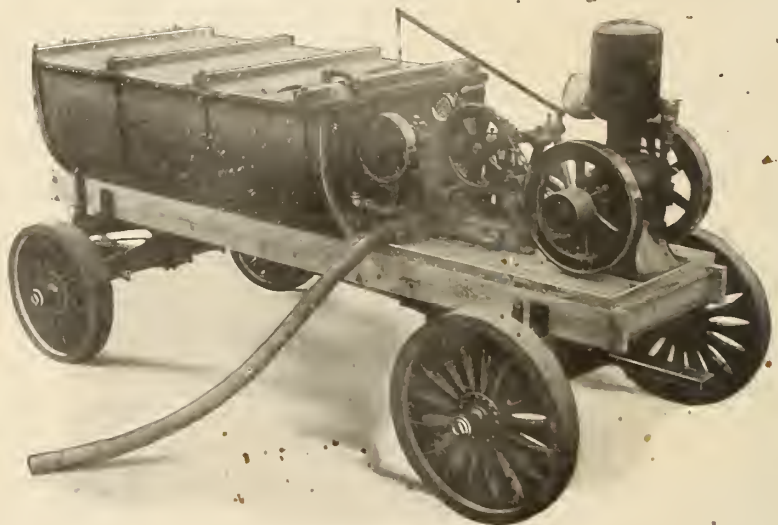
**LENGTH 8 FEET**

**PRICE \$200**

The IDEAL machine for small orchards or where the land is hilly. This machine is equipped with everything to make it practical and convenient—Nozzle Protector, Relief Valve, Belt Tightener, Pressure Gauge, **All-Brass Pump** which is easy to repack, has Brass Ball Valves so arranged that they can be easily got at, Swinging Agitator, etc., etc. The engine is designed especially for the sprayer, is light, strong and compact; cools with two gallons of water. **EASY TO START, EASY TO OPERATE.** This machine will maintain a pressure of 150 pounds, discharging about 250 gallons per hour.

Gasoline Engines  
Spray Hose, Spray Rods  
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Hand Pumps of Every  
Description

## The "Hardie" Triplex Power Sprayer



### Twin Cylinder Pneumatic



No Springs  
No Leathers  
No Bother  
Easy to Pump  
High Pressure

Our "TRIPLEX" Sprayer is built for the large orchard; where great capacity and high pressure are required. It will maintain a pressure of 200 pounds, discharging from eight to ten gallons per minute. Strongly built, runs as smooth as a watch. Rings are "outside packed," valves are large gun metal balls. Fitted with nozzle protector, special relief valve, tank filler pump, etc. These and twenty other styles of Sprayers are built in our own factories at Portland, Oregon, and Hudson, Michigan.

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Hudson, Michigan.

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